INSTALLATION RESTORATION PROGRAM

SOUTH DAKOTA NATIONAL GUARD
JOE FOSS FIELD, SIOUX FALLS, SOUTH DAKOTA

SITE INVESTIGATION REPORT

FINAL

February 1996

AIR NATIONAL GUARD

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
1710 Goodridge Drive
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Site Investigation Report for IRP Site No. 12 and 13, South Dakota Air National Guard, 114th Fighter Wing. Joe Foss Field. Sioux Falls, South Dakota, Volume I. This is the first volume of a two volume site investigation report. Two sites (Site 12 - Ramp area and Site 13 - Motor Vehicle Maintenance Facility) was investigated under the Installation Restoration Program. Soil and groundwater samples were collected and analyzed. No further action was recommended on site 13 and quarterly sampling was recommended for site 12. South Dakota Regulators have agreed to both recommendations. Decision documents will be prepared for each site.

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AIR NATIONAL GUARD
INSTALLATION RESTORATION PROGRAM
114th FIGHTER WING
SOUTH DAKOTA AIR NATIONAL GUARD
JOE FOSS FIELD, SIOUX FALLS, SOUTH DAKOTA

SITE INVESTIGATION REPORT
FINAL

Submitted to:

Air National Guard Readiness Center
Andrews Air Force Base, Maryland 20331

Submitted by:

Science Applications International Corporation
1710 Goodridge Drive
McLean, Virginia 22102

National Guard Bureau Contract DAHA90-94-D-0007
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LIST OF ACRONYMS AND ABBREVIATIONS

ANG	Air National Guard
ANG	Air National Guard
BLS	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
ENR	Environment and Natural Resources
DERP	Defense Environmental Restoration Program
DOD	U.S. Department of Defense
DOI	U.S. Department of Interior
EPA	U.S. Environmental Protection Agency
ETS	Extraction and Treatment System
gal/day/ft	gallons per day per foot
GC	Gas Chromatography
HMTC	Hazardous Materials Technical Center
ID	Inside Diameter
IDW	Investigation-derived Waste
IRP	Installation Restoration Program
MDL	Method Detection Limit
MVMF	Motor Vehicle Maintenance Facility
msl	Mean Sea Level
μg/L-v	micrograms per liter-volume
NGB	National Guard Bureau
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
PA	Preliminary Assessment
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PVC	Polyvinyl Chloride

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

PID	Photoionization Detector
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RI	Remedial Investigation
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SDANG	South Dakota Air National Guard
SI	Site Investigation
SOV	Soil Organic Vapor
TPH	Total Petroleum Hydrocarbons
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

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EXECUTIVE SUMMARY

This report documents the Site Investigation (SI) activities conducted at Site 12 - Ramp Area and Site 13 - Motor Vehicle Maintenance Facility (MVMF) of the South Dakota Air National Guard (SDANG), Joe Foss Field, Sioux Falls, South Dakota, for the Air National Guard Readiness Center (ANG). Figure ES-1 shows the location of Joe Foss Field.

INTRODUCTION

The SDANG facilities occupy 166 acres in the southern portion of Joe Foss Field, the municipal airport for Sioux Falls, as shown in Figure ES-2. The Ramp Area (Site 12) and the MVMF (Site 13) are located within the SDANG facilities, as Figure ES-3 shows. The Ramp Area is used for refueling, taxiing, and parking aircraft. During routine repairs to the ramp in 1993, fuel-contaminated soils were discovered underneath parts of the ramp. Approximately 1,542 tons of petroleum-contaminated soil have been removed from the contaminated areas. The MVMF was constructed in 1976 and consists of an automotive maintenance shop (Building 11) and a fuel dispensing station near the building. Three 2,000-gallon above-ground fuel tanks and buried lines from the tanks to the dispensing pumps are located at Site 13. The fuel lines were tested for leaks in 1993 and 1994, and no leaks were detected during either test. Soil contamination was observed when concrete warning posts were being installed around the fuel dispensing island in July 1994.

FIELD PROGRAM

The objective of this SI was to confirm the presence or absence of petroleum and/or solvent contamination in subsurface soils and groundwater at Sites 12 and 13. The field activities conducted during the SI consisted of:

- A soil organic vapor (SOV, or "soil gas") survey
- Sampling soils and groundwater using a hydraulic probe
- Screening soil and groundwater samples for volatile organic compounds (VOCs), including benzene, toluene, ethylbenzene, and xylenes (BTEX), total petroleum hydrocarbons (TPH), and eight organic solvents (Site 13 only) in the field

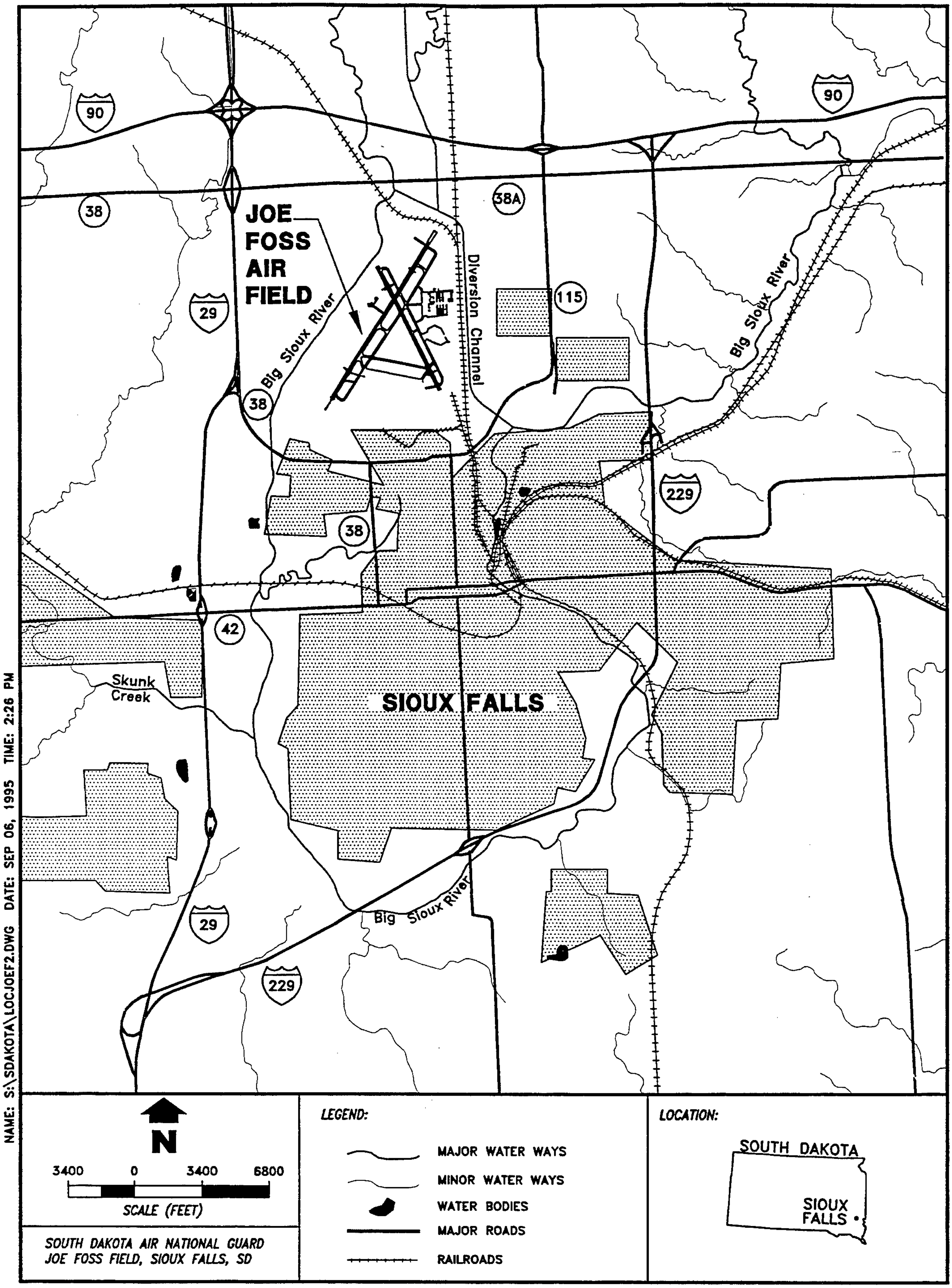

Figure ES-1. Location of Joe Foss Airfield

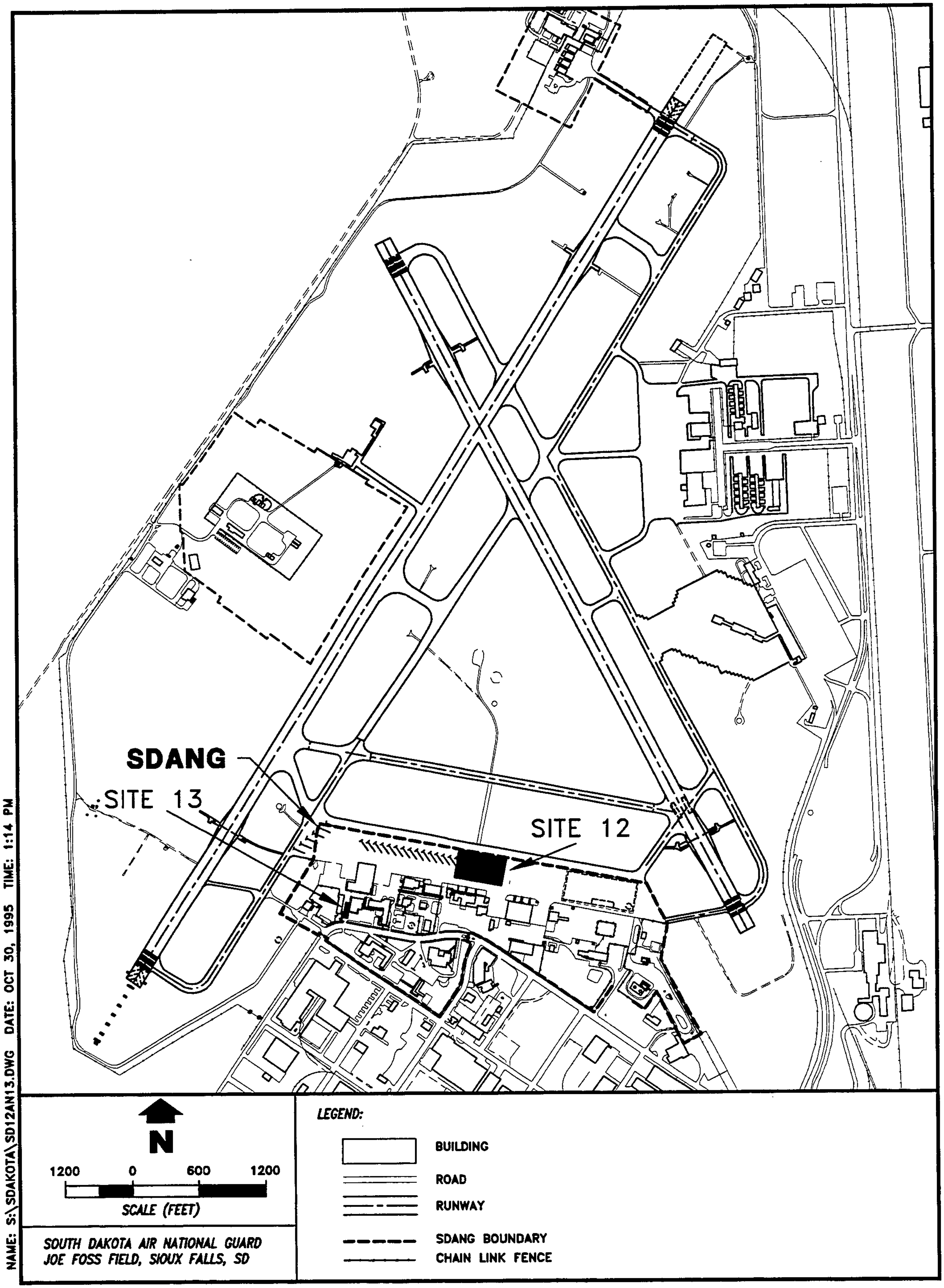

Figure ES-2. Location of SDANG within Joe Foss Airfield and Sites 1 and 3

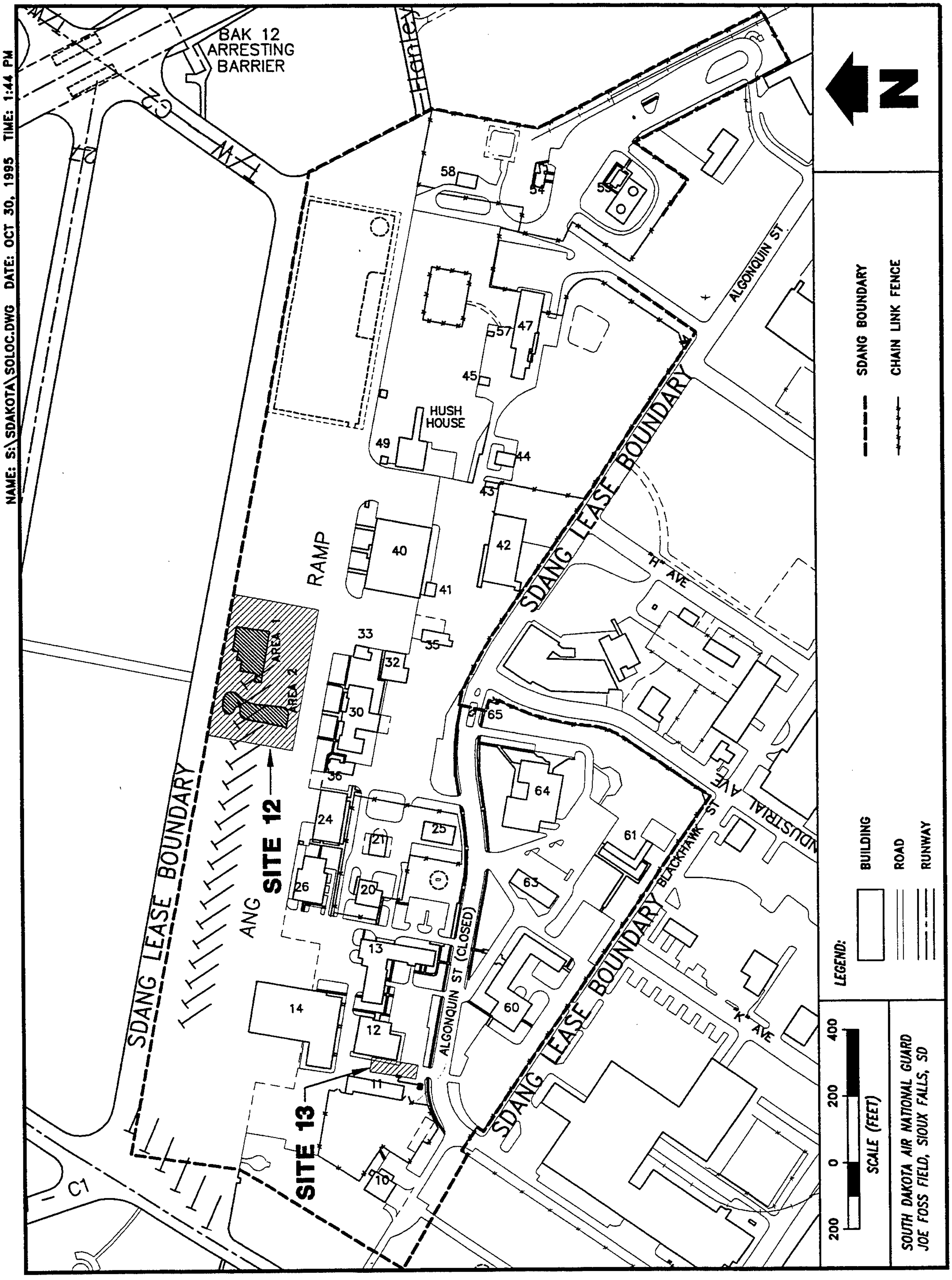

Figure ES-3. Location of Sites 12 and 13, and Sites 8, 9, 10, and 11

- Laboratory analysis of soil and groundwater for BTEX and TPH at both Sites 12 and 13 and for eight organic solvents at Site 13
- Installing six groundwater monitoring wells and three piezometers to monitor water quality and assess groundwater flow direction.

SITE INVESTIGATION RESULTS

Isolated low-level soil contamination was detected during the screening of soil gas and soil samples at Site 12 - Ramp Area. TPH was detected in both soil gas and soil samples at three locations. Two of these locations are east of Area 1. The third location is the northwest corner of Site 12. The maximum concentration of TPH in soils was 10 mg/kg (10 parts per million [ppm]). Ethylbenzene and xylenes were detected in soil gas at two depth intervals at a sampling location east of Area 1. These compounds were not detected in soil samples.

Groundwater samples from five monitoring wells were analyzed for TPH and BTEX. TPH was detected at 81 μg/L in MW12-1. This well was drilled at a soil gas/soil sampling and groundwater screening point where TPH was present above detection limits, east of Area 1. No other compounds were detected in groundwater.

BTEX, TPH, and solvents were not detected in soil and soil gas samples screened at Site 13 - MVMF. Low-level contamination from BTEX, TPH, and solvents was detected immediately around the pump island. BTEX compounds were identified at three locations east, north, and west of the pump island. BTEX, TPH, or solvents were not detected in groundwater in the monitoring well installed at Site 13.

CONCLUSIONS AND RECOMMENDATIONS

Site 12 - Ramp Area—BTEX and TPH were detected in soil gas samples collected immediately east of Area 1. The highest concentrations of soil vapors were detected around a single point east of Area 1. The soil gas detections seem to be most areally extensive in the 6- to 8-foot sampling interval (approximately 9,000 square feet).

TPH was detected in low concentrations in soil samples at two out of five sampling locations during field screening. During laboratory analysis of soils for BTEX and TPH, TPH was present above detection limits at one location. This sampling point coincides with the SOV point showing the maximum concentrations in soil gas.

TPH was detected during groundwater screening by the offsite laboratory at the point where maximum concentrations of soil gas were detected. BTEX compounds were not detected during the groundwater screening. During groundwater analysis of the five monitoring wells, TPH was detected in low concentrations at the well location coinciding with the SOV point previously mentioned.

These findings indicate that isolated areas of soil and groundwater contamination are present at Site 12. TPH contamination in soils may be impacting groundwater quality at Site 12 east of Area 1. TPH was detected in one monitoring well; however, the groundwater results do not indicate TPH migration. Isolated soil and groundwater contamination occur at levels below South Dakota Department of Environment and Natural Resources (DENR) cleanup standards and maximum contaminant levels (MCLs), respectively. One groundwater sample contained TPH in excess of the South Dakota standard for TPH in wellhead protection areas.

Based upon these findings, it is recommended that groundwater monitoring at Site 12 continue under a quarterly monitoring program. Continued monitoring will expand the data set for groundwater at Site 12, allowing ANGRC to determine temporal and spatial variations in TPH concentrations. The data should allow ANGRC to evaluate whether soil contamination east of Area 1 sufficiently impacts groundwater to warrant further study.

Site 13 - Motor Vehicle Maintenance Facility—BTEX, TPH, or solvents were not detected during the SOV survey or onsite soil screening at Site 13. Soils at four locations within Site 13 were analyzed in the laboratory and BTEX, TPH, or solvents were not detected.

BTEX compounds were detected in low concentrations at three groundwater screening locations in the immediate area of the pump island. TPH and solvents were not present above

detection limits. BTEX, TPH, and solvents were not present above detection limits during groundwater analysis of monitoring well GW13-1, located downgradient from the screening samples.

The Site 13 SI data indicate that isolated soil and groundwater contamination occur at levels below the South Dakota DENR cleanup standards and MCLs, respectively. Therefore, no further action is recommended for this site. A decision document recommending no further action should be prepared for Site 13.

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1. INTRODUCTION

This report documents the Site Investigation (SI) activities conducted at Site 12 - Ramp Area and Site 13 - Motor Vehicle Maintenance Facility (MVMF) of the South Dakota Air National Guard (SDANG), Joe Foss Field, Sioux Falls, South Dakota, for the Air National Guard Readiness Center (ANG). The SI activities were completed under National Guard Bureau (NGB) Contract No. DAHA90-94-D-0007. The SI field activities were conducted in June and July 1995 by Science Applications International Corporation (SAIC) and were accomplished in accordance with the SI Work Plan (SAIC 1995). The following sections present background information, the purpose and scope of the SI, and the methodology used for the investigation.

1.1 BACKGROUND

The Environmental Restoration Program (ERP) was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at U.S. Department of Defense (DOD) installations. On January 23, 1987, Presidential Executive Order 12580 was issued, which assigned responsibility to the Secretary of Defense for carrying out ERP within the overall framework of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA). The Installation Restoration Program (IRP) was established under ERP to identify, investigate, and clean up contamination at DOD installations. The IRP is focused on cleanup of contamination associated with past DOD activities to ensure that risks to public health are eliminated and to restore natural resources for future use. ANG manages the IRP and related activities.

SDANG is located at Joe Foss Field, the municipal airport in Sioux Falls, in southeast South Dakota, as shown in Figure 1-1. SDANG was established in 1946 to provide air combat preparedness. The facilities at SDANG, including aircraft hangers, administrative buildings, and vehicle maintenance facilities, occupy 166 acres on the southern edge of Joe Foss Field, as shown in Figure 1-2. Joe Foss Field sits on the floodplain between the Big Sioux River and engineered diversion channels.

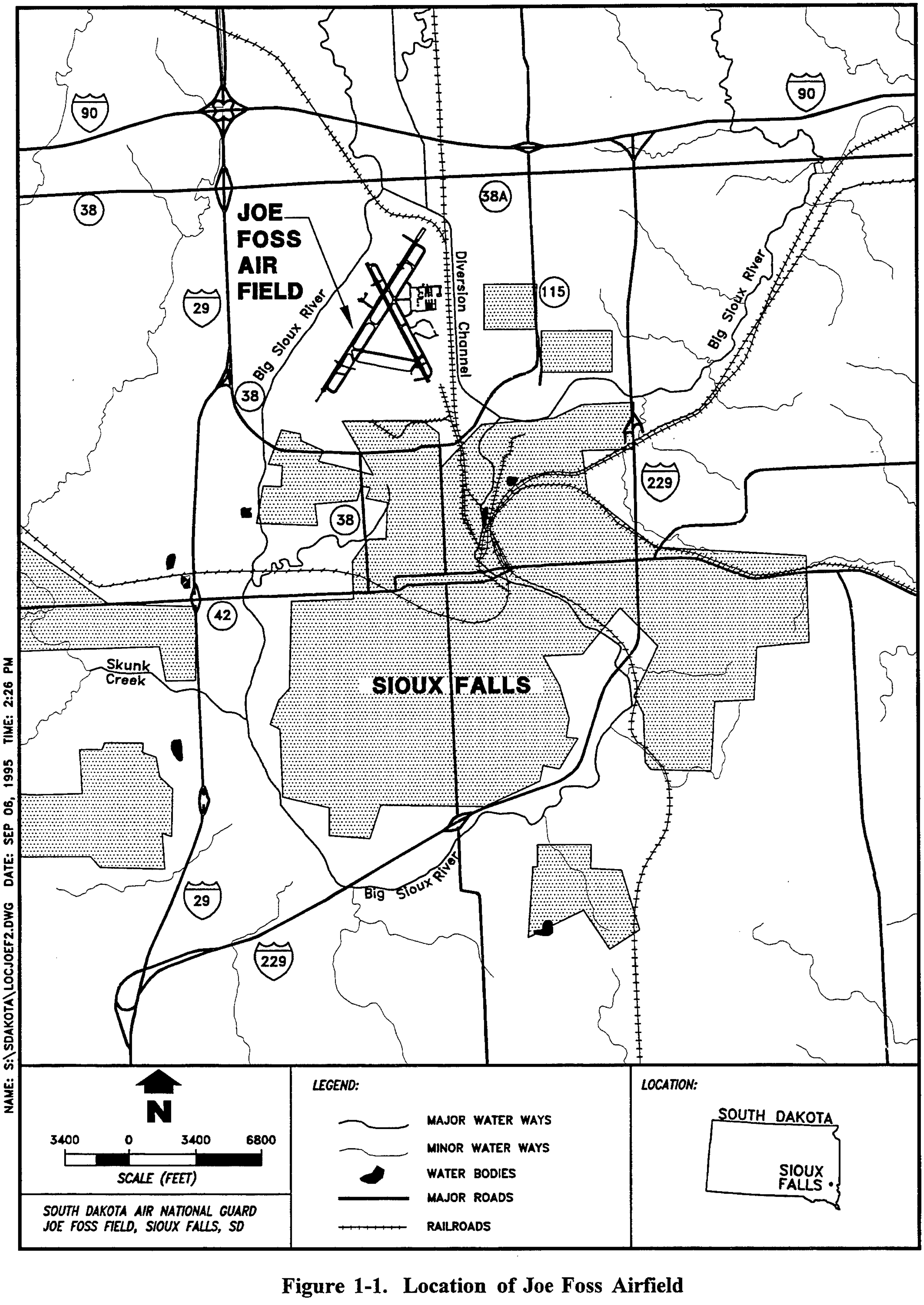

Figure 1-1. Location of Joe Foss Airfield

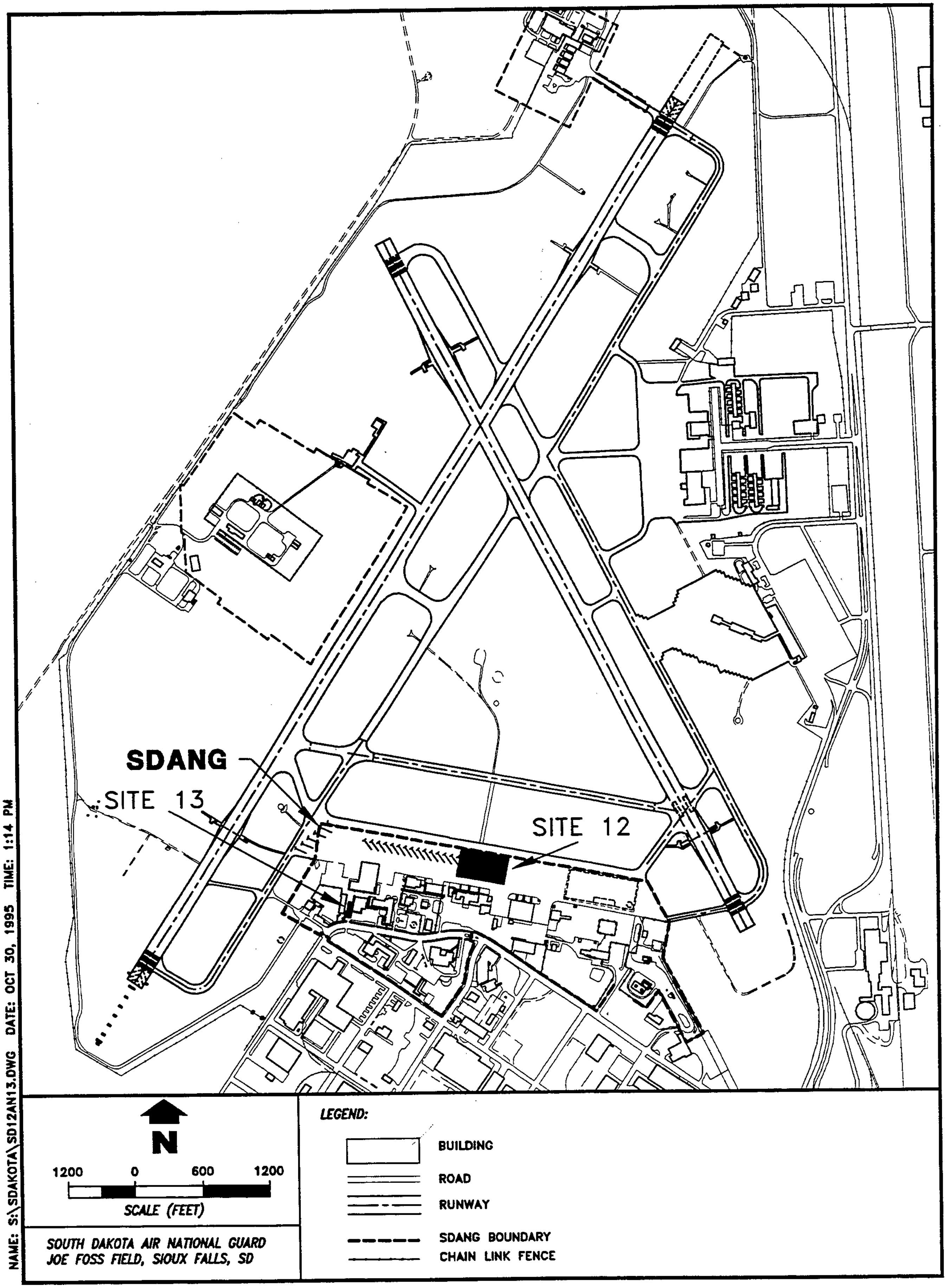

Figure 1-2. Location of SDANG within Joe Foss Airfield and Sites 1 and 3

A Preliminary Assessment (PA) of SDANG was conducted by the Hazardous Materials Technical Center (HMTC) in 1986 to identify areas that required further study. Previous investigations of SDANG have included site investigations of areas southeast and northwest of Sites 12 and 13; Remedial Investigations (RIs) of Site 1 - Underground Fuel Storage Area and Site 3 - Base Fire Training Area (Figure 1-2), resulting in the installation of an extraction and treatment system (ETS) to remove volatile organic compounds (VOCs) at Site 1 and soil at Site 3; and underground storage tank (UST) removal at Sites 8, 9, 10, and 11 (Figure 1-3).

Soil contamination at Site 12 - Ramp Area was first observed in 1993 during routine ramp repair. Soil contamination at Site 13 - MVMF was first observed in 1994 when posts were being installed around the fuel dispensing island. Observations made when the contamination was discovered were odors indicative of petroleum fuel.

1.2 PURPOSE AND SCOPE

The objective of the SI conducted at Sites 12 and 13 was to confirm the presence or absence of petroleum and/or solvent contamination in subsurface soils and groundwater at the two sites. This report presents the approach to the SI field investigation, describes the field screening and laboratory analytical results, and makes recommendations for future action at the sites.

The scope of work for the SI included a soil organic vapor (SOV) survey, subsurface soil and groundwater sampling using a hydraulic probe, installation of piezometers and monitoring wells, and two rounds of monitoring well sampling. All work was conducted in accordance with Federal, state, and local regulations, and followed site-specific sampling and health and safety protocols, as specified in the SI Work Plan (SAIC 1995). Laboratory chemical analyses were conducted in accordance with project quality assurance/quality control (QA/QC) requirements as presented in the Quality Assurance Project Plan (QAPP) (Appendix A of the SI Work Plan).

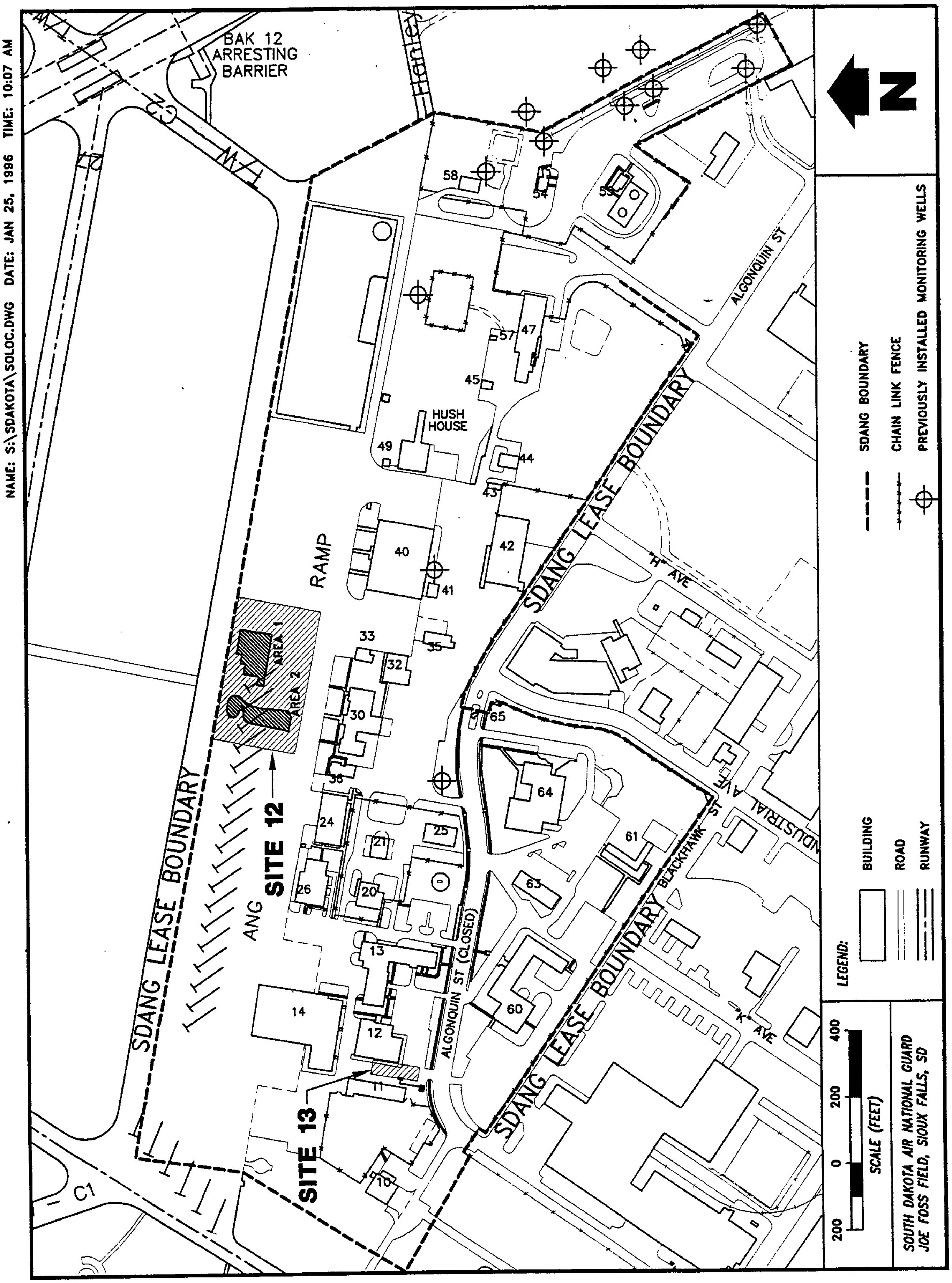

Figure 1-3. Location of Sites 12 and 13, and Sites 8, 9, 10, and 11

The report is organized into the following sections. Section 2 describes the location, organization, and history of the SDANG facility. This includes the results of the PA conducted at SDANG (HMTC 1986) as well as information concerning specific activities associated with Sites 12 and 13. Section 3 describes the geologic, hydrogeologic, climatic, and ecologic setting of the study area, including specific information obtained during the SI at Sites 12 and 13. Section 4 discusses the approach and procedures used during the SI field investigation, and includes information on the SOV survey, hydraulic probe sampling, and piezometer and well installation. Section 5 evaluates the field screening and laboratory analytical results for Sites 12 and 13, and summarizes the extent of soil and groundwater contamination. In Section 6, conclusions are made for each site, and recommendations for future action at each site are outlined in Section 7 based on these conclusions. The data generated for the SI are presented in the appendices, including boring logs and construction diagrams for the monitoring wells installed. The *Data Requirements for Federal Facility Docket Sites,* which enables the U.S. Environmental Protection Agency (EPA) to perform hazard ranking, is included in Appendix G.

1.3 METHODOLOGY

The following methodology was adopted to minimize the number of soil borings and monitoring wells to be installed in order to confirm the presence or absence of contamination in soil and groundwater at Sites 12 and 13. Section 4 contains specific information on investigative methods and equipment.

An SOV survey was conducted at both Sites 12 and 13. The SOV survey was used to estimate the extent of subsurface soil contamination, and to determine optimum locations for hydraulic probe sampling and monitoring wells. During the SOV survey, soils were screened for VOCs and total petroleum hydrocarbons (TPH). During the hydraulic probe survey of Site 12, groundwater screening for VOCs and TPH was conducted to characterize the groundwater quality beneath the site.

Groundwater samples were collected using the hydraulic probe at Sites 12 and 13, and from six monitoring wells. Groundwater sampling locations, including piezometer and monitoring well locations, were chosen by the ANGRC hydrogeologist and SAIC, with

concurrence from the South Dakota Department of Environment and Natural Resources (DENR). Monitoring well samples were collected to characterize groundwater quality at Sites 12 and 13. These samples were analyzed for TPH and benzene, toluene, ethylbenzene, and xylenes (BTEX); at Site 13, samples also were analyzed for eight organic solvents (vinyl chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, 1,2-dichloroethene, tetrachloroethene, and carbon tetrachloride).

Subsurface soil samples were collected using the hydraulic probe to characterize soil contamination. Subsurface soil samples from depths of 0 to 9 feet were analyzed for TPH and BTEX at Site 12; at Site 13, samples also were analyzed for solvents. Subsurface soil samples were collected during monitoring well installation to further characterize the geology of the subsurface materials. One sample was collected from each monitoring well boring for laboratory geotechnical testing (maximum depth of 15 feet).

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2. INSTALLATION DESCRIPTION

This section describes the location of the South Dakota Air National Guard (SDANG), including the locations of Site 12 - Ramp Area and Site 13 - Motor Vehicle Maintenance Facility (MVMF). The organization and history of SDANG is summarized, and individual histories of Sites 12 and 13 are provided.

2.1 LOCATION

Joe Foss Field is the municipal airport for Sioux Falls, South Dakota. The airfield is located within the city limits of Sioux Falls and is 2 miles north of the downtown area (Figure 1-1). The SDANG facilities occupy 166 acres in the southern portion of Joe Foss Field and contain hangers for aircraft parking and repairs, and buildings for administration and vehicle maintenance (Figure 1-2).

Both Sites 12 and 13 are located within the SDANG facilities. Site 12 - Ramp Area is located north of Building 30 and in the north-central portion of SDANG. Site 13 - MVMF consists of Building 11 and a fuel dispensing station located east of Building 11 in the western portion of SDANG (Figure 1-3).

2.2 ORGANIZATION AND HISTORY

The 114th Fighter Wing of SDANG shares the airfield with civilian aviation. The property has been leased by the Air National Guard (ANG) from the city of Sioux Falls since 1946. The municipal airport at Sioux Falls was built in 1935 by the Works Progress Administration. On July 6, 1942, the U.S. Army opened the Sioux Falls Radio Technical School at the airport on land acquired from the city of Sioux Falls. The training school officially closed on May 31, 1945, and became the Sioux Falls Army Airfield on June 1, 1945. On December 31, 1945, the Sioux Falls Army Airfield was deactivated and the property was reverted to the city of Sioux Falls. SDANG was established at the Sioux Falls Municipal Airport on September 20, 1946.

In support of its primary mission of providing air combat preparedness, the Base has stored and used various types of hazardous materials, such as fuel and oil, during its history. Although some historical operations at SDANG have resulted in the storage and use of hazardous materials, not all of these operations relate to Installation Restoration Program (IRP) sites. Table 2-1 summarizes the operations conducted at the Base, and the hazardous substance activities associated with these operations.

2.2.1 Previous Activities

A Preliminary Assessment (PA) was conducted at SDANG by the Hazardous Materials Technical Center (HMTC) in 1986. The PA identified the following two sites for further study: Site 1 - Underground Fuel Storage Area and Site 3 - Base Fire Training Area. Remedial Investigations (RIs) of Sites 1 and 3 were completed by Science Applications International Corporation (SAIC) in July 1989 (SAIC 1990). Both investigations resulted in remedial actions. At Site 1, a treatment system was installed. Soils were excavated and transported to a landfill at both Sites 1 and 3. In November 1993, the operation of the treatment system at Site 1 was discontinued because the influent to the treatment system met the National Pollutant Discharge Elimination System (NPDES) criteria for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylenes (BTEX). The South Dakota Department of Environment and Natural Resources (DENR) requires no further soil excavation at Sites 1 and 3, and no additional groundwater monitoring at Site 3 (DENR 1993).

Because of the geographic distance of Sites 1 and 3 from Sites 12 and 13, and the closure of the sites by the South Dakota DENR, a detailed review of the remedial activities and the supporting data from these activities is not included in this Site Investigation (SI) report.

Underground storage tanks (USTs) and any associated contaminated soils have been removed from Sites 8, 9, 10, and 11 (Figure 1-3).

2.2.2 Background and Operational History of Site 12

Site 12 - Ramp Area is used for refueling, taxiing, and parking aircraft. Site 12 is part of a larger aircraft parking apron and taxiway at SDANG. SDANG initiated a ramp repair

Table 2-1. History of Base Operations
South Dakota Air National Guard, Sioux Falls, South Dakota

Period	Type of Operations	Mission/ Weapon Systems	Hazardous Substance Activity
1942-1945	Sioux Falls Radio Technical School (U.S. Army)	Radio training of Army personnel	Fuel/oil storage, weapons storage, machine shop operations
1946-1954	175th Fighter Squadron	P-51 Mustang, C-47, A-26, AT-6, and L-5 aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training
1954-1956	175th Fighter Squadron	F-94 A/B Starfire aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training, drum storage
1956-1958	114th Fighter Interceptor Group	F-94C Starfire aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training, drum storage
1958-1962	114th Fighter Group	F-89J aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training
1962-1970	114th Fighter Group	F-102 aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training
1970-1977	114th Tactical Fighter Group	F-100D aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training
1977-1991	114th Tactical Fighter Group	A-7D aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training
1991-present	114th Fighter Group	F-16 aircrafts	Fuel/oil storage, weapons storage, machine shop operations, fire training

Source: SAIC 1995

project in 1993, consisting of removing selected areas of the existing concrete parking apron and taxiway, preparing the subgrade, installing an underdrain system, and replacing the concrete pavement. Following removal of the existing concrete pavement, construction personnel noted petroleum odors in two areas (designated Areas 1 and 2). The location of these areas in relation to existing structures is illustrated in Figure 2-1. Area 1 is located north of Building 30 and Area 2 is located west of Area 1. Soil contamination was observed along the expansion joints using a photoionization detector (PID). Soils were excavated to a depth of 8 feet below land surface (BLS) at Area 1 and 3 feet BLS at Area 2. The excavation depth was determined based on field screening of soil samples for organic vapors using two PIDs. At both Areas 1 and 2, the soil contamination was localized and varied with depth (e.g., Area 2 PID data indicated contamination at ½ foot depth (375 ppm) and no contamination at depths of 1, 2, and 3 feet BLS). At Area 1, organic vapor concentrations at a depth of 8 feet BLS ranged from nondetect (ND) to a maximum of 353 ppm (Geotek 1993). Approximately 1,524 tons of petroleum-contaminated soils were removed and transported to the Runge Landfill in Sioux Falls, South Dakota.

2.2.3 Background and Operational History of Site 13

Site 13 - MVMF was constructed in 1976 and consists of an Automotive Maintenance Shop (Building 11) and a fuel dispensing station located east of Building 11, as shown in Figure 2-2. The facility consists of three 2,000-gallon above-ground fuel storage tanks, which are located south of Building 11. The buried fuel lines from the tanks to the dispensing pumps were tested for leaks in May 1993 and August 1994. On both occasions, the lines passed the leak detection test (SAIC 1995). The area around the fuel dispensing island is paved with asphalt. Soil contamination was first observed when concrete posts were being installed around the fuel dispensing island in July 1994.

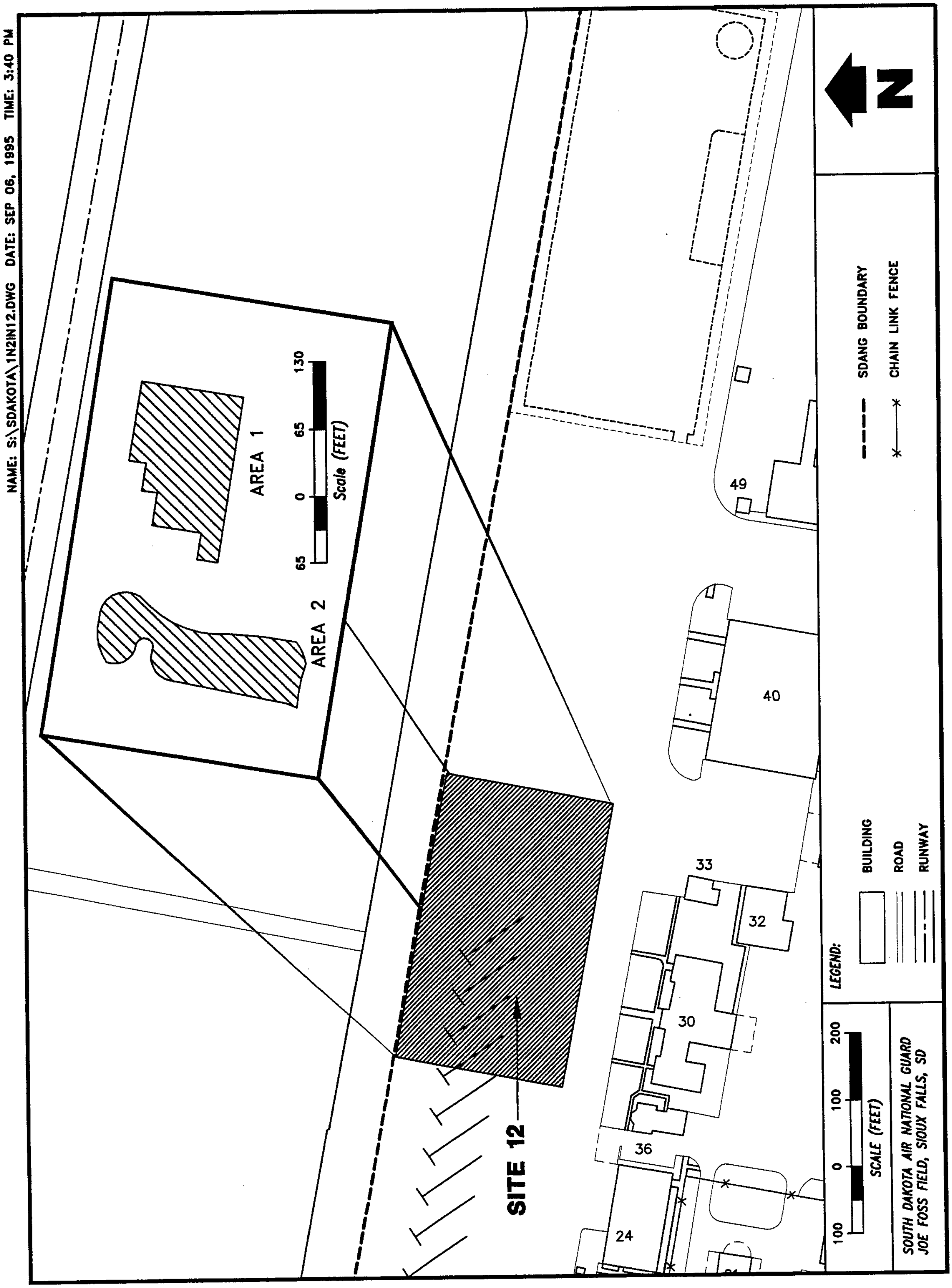

Figure 2-1. Location of Areas 1 and 2 within Site 12

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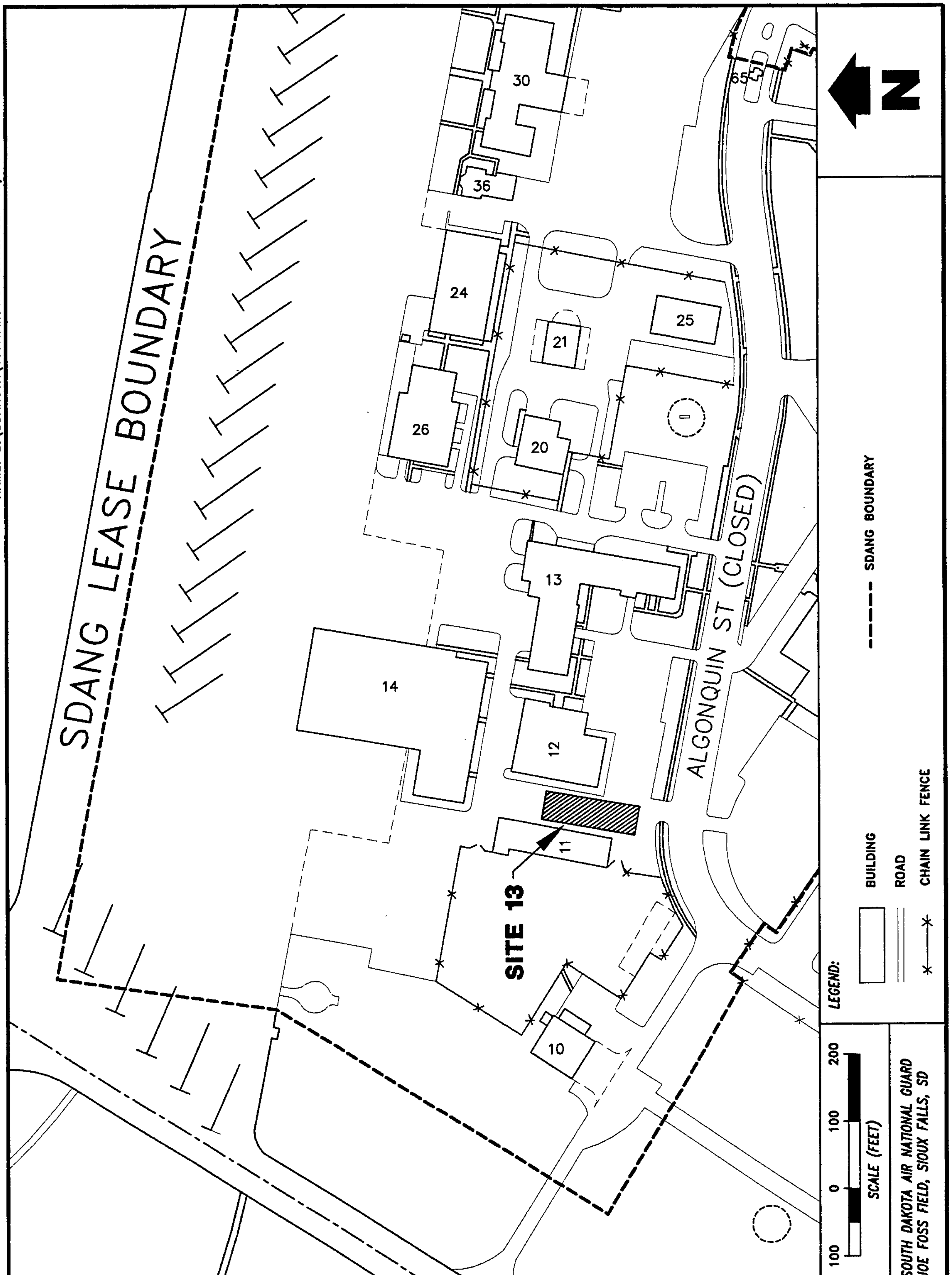

Figure 2-2. Location of Site 13

3. ENVIRONMENTAL SETTING

This section summarizes the geographical setting, regional and site geology, hydrology, climate, and critical habitats/endangered species for the South Dakota Air National Guard (SDANG). Sioux Falls is located in the Big Sioux River Valley in southeastern South Dakota. The surrounding terrain is composed of gently rolling hills, typical of the glaciated midwestern United States.

SDANG lies at the extreme southern edge of the Coteau des Prairies (Prairie Hills). This feature is a highland plateau in the western part of the Central Lowland Province, between the Minnesota River lowland to the east and the James River lowland to the west. The Big Sioux River, which runs adjacent to SDANG, is the only large stream that drains the Coteau des Prairies (Koch 1982).

SDANG lies entirely within the floodplain of the Big Sioux River, which has a flooding recurrence interval of 2.3 years (Jorgensen and Ackroyd 1973). Consequently, the associated topography of the SDANG area has little or no relief within a 1-mile radius of the site, as Figure 3-1 shows. The floodplain lowland is approximately 3 miles wide in the area of the airfield, which is nearly centered upon the floodplain. The Big Sioux River and the Diversion Channel have low gradients near the airfield.

3.1 METEOROLOGY

Climatic data for Sioux Falls are based on National Oceanic and Atmospheric Administration (NOAA) records from 1958 to 1987. The mean annual temperature in Sioux Falls is 46.1°F. Annual precipitation averages 25.18 inches. The wettest month is June, with an average precipitation of 4.14 inches. January is the driest month, with an average precipitation of 0.60 inches. Annual snowfall averages 39.7 inches. Net precipitation for the area is negative 9.63 inches per year, when calculated according to the method given in the Federal Register (HMTC 1986). Rainfall intensity based on a 1-year, 24-hour rainfall is 4.59 inches (HMTC 1986).

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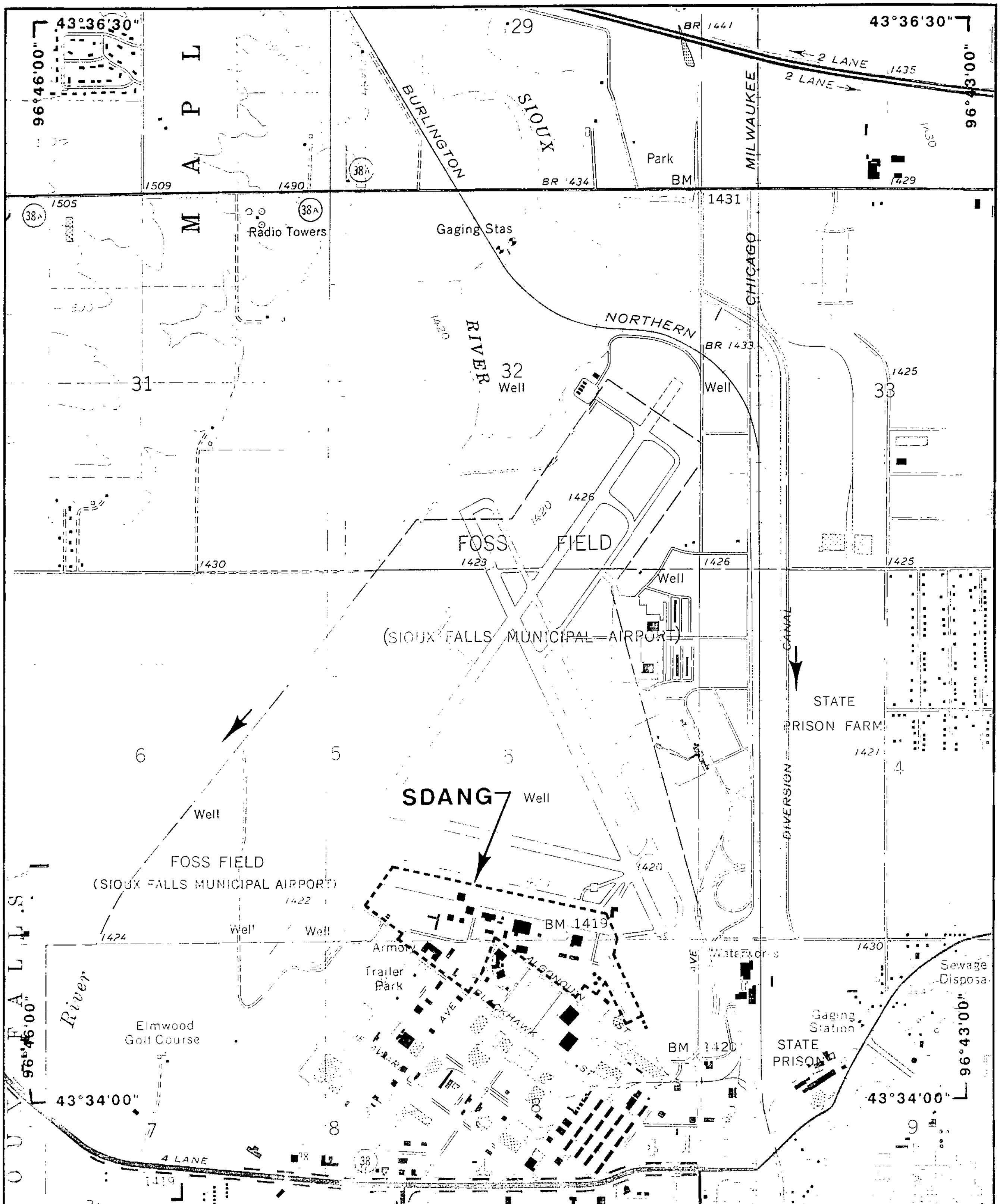

N

1000 0 1000 2000

FEET

LEGEND

Contour Line (contour interval 10 feet)

Flow Direction

Base Property Boundary

Reference: Sioux Falls East and Sioux Falls West 7.5 Minute Series (topographic), U.S. Geological Survey, 1976.

TOPOGRAPHY OF SDANG AND VICINITY

South Dakota Air National Guard
Joe Foss Field, Sioux Falls, SD

Figure 3-1. Topography of SDANG and Vicinity

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3.2 GEOLOGY

3.2.1 Regional Geology

The geology of the Sioux Falls area is dominated by the effects of continental glaciation. The study area is within the Coteau des Prairies, a highland plateau. Figure 3-2 shows a generalized conceptual representation of the geology of this area (USDA 1964). This high plateau is an expression of the Sioux Uplift, a bedrock high that occurs within the area. The bedrock high deflected the southward advancing ice sheets to the east and the west and protected the highland area from glacial erosion. The Coteau des Prairies is flanked to the east and west by the moraines of these deflected ice sheets. Glacial outwash was deposited by streams of glacial meltwater originating from the continental ice sheets, on either side of the Coteau des Prairies, during periods of glacial retreat. The meltwater from these surrounding ice sheets was directed onto the Coteau des Prairies and into the Big Sioux River, which was a much larger braided river at the time.

The geology in the region consists of crystalline bedrock overlain by as much as 200 feet of glacial deposits. Within the Big Sioux River valley there is a thin (generally less than 15 feet), discontinuous mantle of alluvial sediments overlying the glacial deposits (Jorgensen and Ackroyd 1973).

In the Coteau des Prairies, bedrock consists of the Sioux Quartzite of Precambrian Age, thought to be more than 4,000 feet thick. The quartzite forms bedrock highs both in the Sioux Falls area and to the north near the town of Dell Rapids, where it forms rapids and waterfalls. In outcrop, this fine-grained formation exhibits relict bedding features, is extremely hard and fractured, and is pink (Jorgensen and Ackroyd 1973).

Approximately 200 feet of glacial sediment cover the quartzite over most of the region, with the exception of areas near bedrock highs, where sediments overlying the bedrock gradually thin and "pinch out." The sediment consists primarily of glacial till and glacial outwash. The glacial till is characterized by unstratified, unsorted masses of glacial debris, ranging in size from fine clayey material to large boulders. The till is approximately 200 feet thick in some parts of the Coteau des Prairies, but is generally thinner in the Big Sioux River valley, where

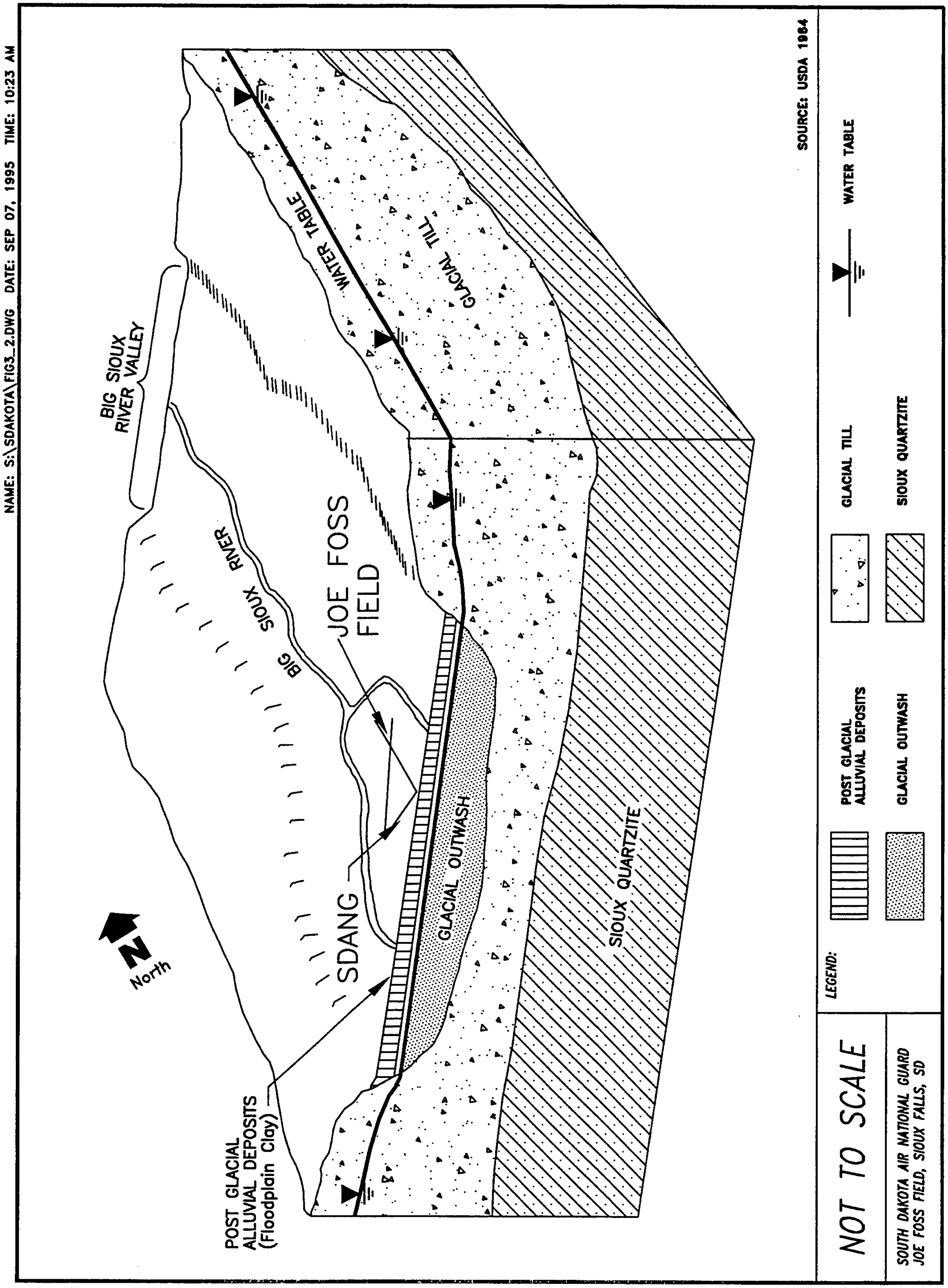

Figure 3-2. Generalized Hydrogeologic Conceptual Model of the Coteau des Prairies

it has been eroded by the scouring of the river. The till is very thin or nonexistent in the localized bedrock high areas in the Sioux Falls area.

Restricted laterally to the river valley and to the north and south by Sioux Quartzite outcrops, at least 50 feet of coarse-grained glacial sediment has been deposited upon the till. This glacial outwash consists of stratified coarse sand and gravel along with trace amounts of silt and clay.

A variably thick (0- to 20-foot) mantle of post-glacial alluvial deposits overlies the sediment within the river valley. Post-glacial alluvial deposits were formed by re-deposition of glacially derived sediments by the Big Sioux River. The deposits consist of very fine-grained floodplain deposits with some slightly coarser-grained river channel deposits. Because of their thinness and surface location, the floodplain deposits have been disturbed by construction activities throughout the valley.

3.2.2 Site Geology

Soil sampling associated with drilling operations during the Site Investigation (SI) provides details on the subsurface geology at SDANG. Additional information was obtained from soils data collected during the 1986 Remedial Investigation (RI) at Site 1 - Underground Fuel Storage Area and Site 3 - Base Fire Training Area (SAIC 1990). Sediments encountered included post-glacial alluvial deposits (floodplain clay), glacial outwash, and glacial till (SAIC 1990). Soil boring logs from the SDANG SI field program are presented in Appendices B, C, and D.

A surface layer of post-glacial alluvial deposits was encountered in all soil borings and monitoring wells at SDANG. The layer was laterally continuous throughout the site, with the exception of Site 1 - Underground Fuel Storage Area and Site 9 - Underground Storage Tank. At these sites, past construction activities have disturbed or eliminated this layer. In general, this 6- to 15-foot thick deposit consists of dark gray, clayey silt with traces of fine sand. However, in the area of Site 12 - Ramp Area and Site 13 - Motor Vehicle Maintenance Facility

(MVMF), this layer consists of very dark brown to black, very fine, highly plastic clay, which grades into a dark gray to brown, clayey silt with traces of fine sand.

Glacial outwash was encountered underlying the surface alluvial deposits. The deposits ranged from 20 to approximately 25 feet thick at Site 1. Samples generally were composed of gray to dark olive brown, sandy gravels with traces of silt and clay. Glacial till was found beneath the outwash at Site 1. The outwash/till contact was located at a depth of approximately 30 to 35 feet. The thickness of this till unit is approximately 100 to 130 feet in the vicinity of SDANG (Koch 1982). However, during the SI, the base of the till was not penetrated.

The character of the post-glacial alluvial deposits determines the soil types found at the sites. Figure 3-3 shows the soil types present in the immediate area of SDANG. The majority of these soil types are in the Luton-Dimmick association. These soils consist of fine-textured to moderately fine-textured floodplain soils. The soil type underlying both Sites 12 and 13 is the Luton, which is the finest grained of the association. In addition, the Rauville and Dimmick soils are close to each site; these soil types are slightly coarser grained and are associated with river channel deposits (USDA 1964).

3.3 REGIONAL AND LOCAL HYDROLOGY

3.3.1 Regional Subsurface Hydrology

The primary aquifer in the Sioux Falls area, the Big Sioux Aquifer, constitutes approximately 36 square miles within the saturated portions of the gravelly sand glacial outwash deposits, as shown in Figure 3-4. This figure also illustrates the approximate boundaries of the aquifer. The water table aquifer is generally bounded underneath and to the east and west by glacial till and to the north and south by the bedrock highs of the Sioux Quartzite. These materials form low permeability boundaries to the aquifer. Regionally, the aquifer ranges in thickness from 0 feet where the sediments pinch out along the valley flanks and Sioux Quartzite outcrops, to as much as 50 feet within the south-central portions of the valley.

Recharge of the aquifer is primarily by precipitation infiltration and seepage from the Big Sioux River. Of the precipitation that fell within the drainage area of the Big Sioux River

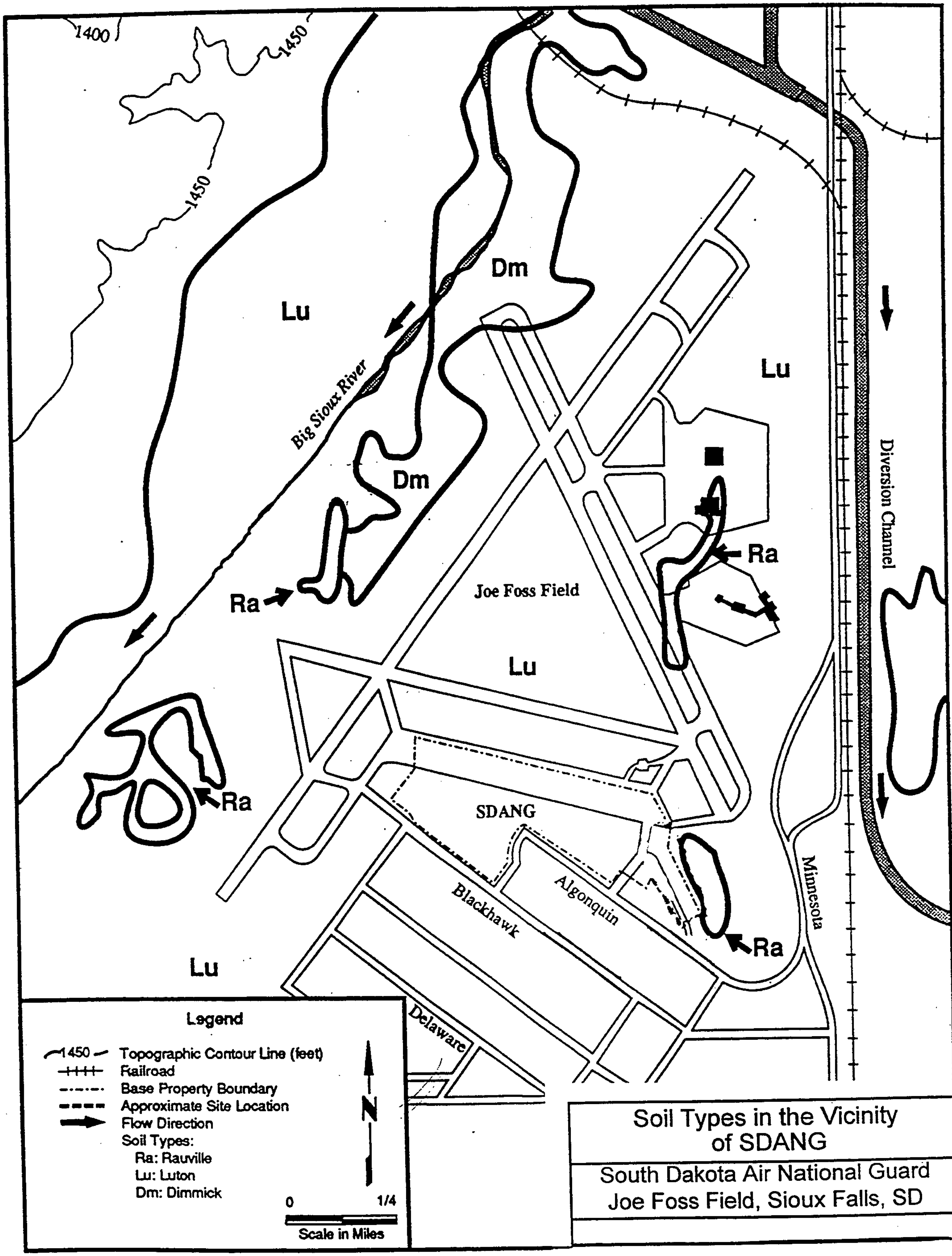

Figure 3-3. Soil Types of SDANG and Vicinity

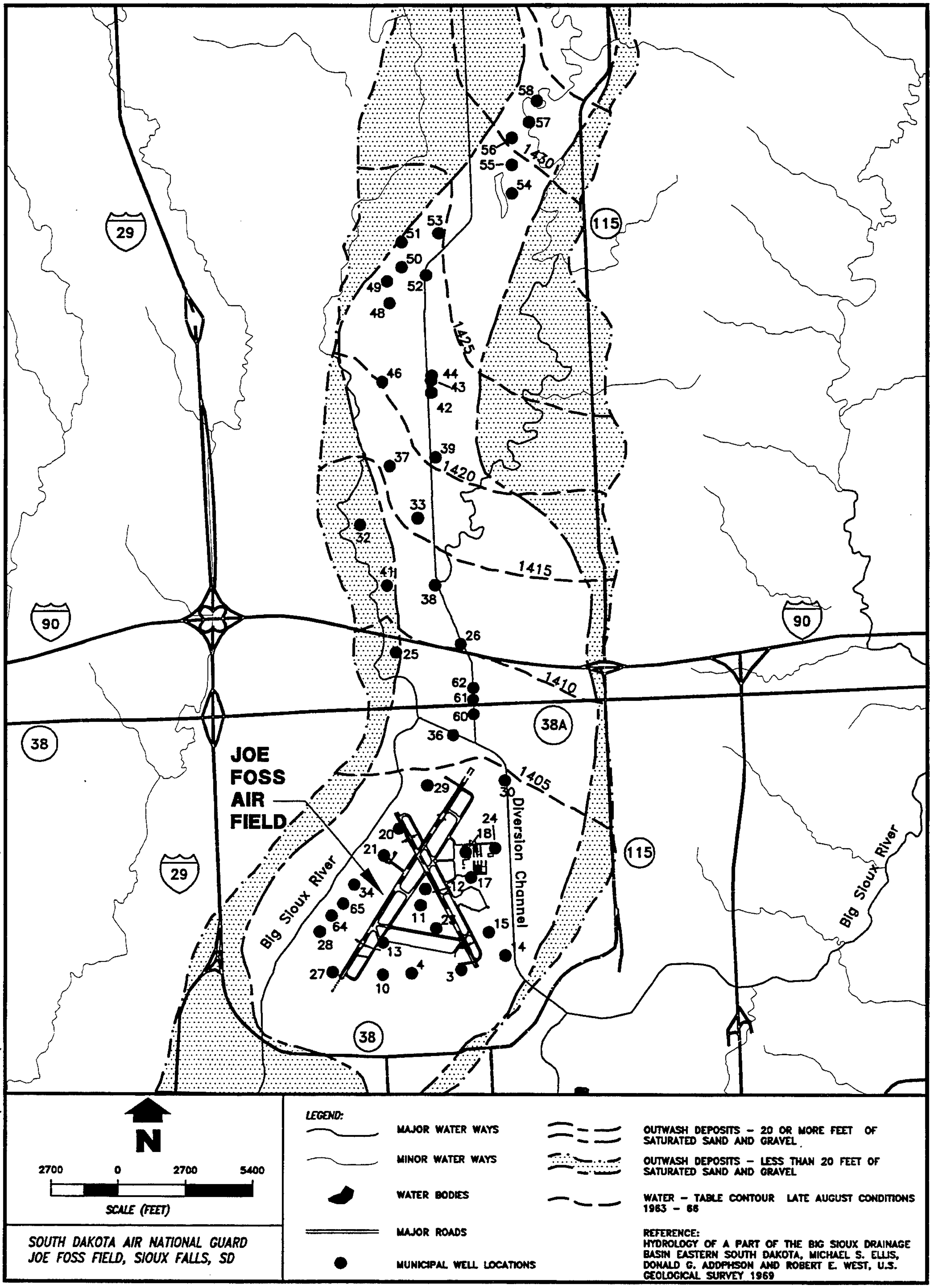

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Figure 3-4. The Big Sioux Aquifer at SDANG and Vicinity

between 1970 and 1979, an estimated 90.5 percent was returned to the atmosphere through evapotranspiration, 1.5 percent was contributed to the surface water runoff, and 8 percent was added to aquifer storage (Koch 1982). Recharge by river seepage occurs primarily in the southern third of the aquifer where seepage is induced by the pumping of the city of Sioux Falls municipal well field. During periods of low stream flow, as much as 95 percent of the stream flow may infiltrate into the aquifer in this area (Koch 1982). Stream bed infiltration rates have been measured ranging from 4 to 7.4 gallons per day per foot (gal/day/ft) and vary according to scouring of the stream bed, the influence of dams, dredging activities, and stream levels (Jorgensen and Ackroyd 1973).

Discharge of the aquifer occurs through evapotranspiration and seepage into the Big Sioux River and by groundwater pumpage. Discharge by seepage from the aquifer into the river occurs primarily in the northern two-thirds of the aquifer. Groundwater pumpage occurs primarily in the southern third of the aquifer by the city of Sioux Falls municipal well field. Approximately 3.2 billion gallons were extracted from the aquifer in 1993.

The following information represents average trends and that the hydrologic system is dynamic, fluctuating seasonally and yearly, depending on the relative strengths of the components of aquifer recharge and discharge. Groundwater table depths vary from 0 to 20 feet below land surface (BLS). Water table elevations range from 1,400 to 1,470 feet above mean sea level (msl) in the southern and northern portions of the aquifer, respectively. Yearly groundwater level fluctuation averages 4.2 feet, depending on pumping and precipitation amounts (Koch 1982). Groundwater levels tend to rise in the spring and early summer when precipitation (snowmelt and rainfall) infiltration is highest. Levels are lower from mid-summer to late fall when precipitation is low and groundwater pumpage is at a maximum. Significant changes in the water levels in the aquifer depend upon recharge and withdrawal rates. During the SI field program, the water table was present at 7 to 9 feet BLS. As a part of their water level monitoring program, the city of Sioux Falls has collected and recorded water level measurements in as many as 71 monitoring wells completed in the Big Sioux Aquifer since 1979. Currently, the water levels in 53 monitoring wells are measured monthly and an additional 10 monitoring wells are monitored 2 to 4 times a year.

In the northern two-thirds of the aquifer, groundwater flow is generally north to south, with a component of flow toward the river, where groundwater discharges. In the southern one-third of the aquifer, groundwater flow directions are influenced by pumping at the municipal well field. Generally, flow is directed radially inward toward the central portion of the valley.

Hydraulic conductivity (K) values range from 1,500 to 6,500 gal/day/ft (10^{-2} to 10^{-1} cm/sec) (Koch 1982). Hydraulic conductivity values obtained by the city of Sioux Falls for short-term pumping tests of 39 municipal wells ranged between 5.54×10^{-1} cm/sec and 2.0×10^{-2} cm/sec (HDR 1990).

The primary use of groundwater in the southern one-third of the Big Sioux Aquifer is the municipal water supply for the city of Sioux Falls. The production wells are located in a well field that covers the southern one-third of the aquifer. The majority of these wells are located adjacent to the Big Sioux River to take advantage of induced recharge effects. Figure 3-4 and Table 3-1 show the locations of the municipal wells and 1994 pumpage for the municipal water supply, respectively. In 1994, total pumpage from these groundwater wells exceeded 3.2 billion gallons. The well field is augmented by two surface water intakes within the Diversion Channel, which supplied 2 billion gallons in 1993. Municipal wells 3, 4, 10, 13, 15, and 23, located near SDANG, are only pumped periodically by the city for preventive maintenance and are not currently in use for water supply. Relatively small amounts of groundwater also are used for water supply in small communities to the north and for irrigation purposes throughout the valley.

3.3.2 Site Hydrology

The saturated outwash deposits comprise the Big Sioux Aquifer in the study area. Characteristics of this aquifer are summarized in Table 3-2. Figure 3-5 shows the hydrograph of the water level measured in 1993 in municipal wells 4, 10, 14, and 15 located near SDANG. The static water level fluctuations agree with the seasonal variations of higher levels in the summer and decreasing during the fall and winter. The static water levels during the SI were higher than those observed during the RI conducted at SDANG in 1988 and 1989 due to higher than normal precipitation.

TABLE 3-1. Summary of Sioux Falls, South Dakota Municipal Water Supply Well Data (1994)

Well ID	Type	Year Constructed	Depth (ft)	Diameter (ft)	Gallons Pumped (1993)	Hours Pumped (1993)	Pumping Rate (GPM)	Percent Of Total
3	Wolfe	1911	32	50	1,382,800	94	245	0.02
4	Ranney	1931-1956	34	50	8,542,900	126	1130	0.13
10	Early Bragstad	1934	37	18	4,037,000	104	647	0.06
11	Early Bragstad	1934	37	18	9,230,300	285	540	0.14
12	Early Bragstad	1941	36	18	10,644,000	283	627	0.16
13	Bragstad	1941	35	40	9,267,000	162	953	0.14
14	Bragstad	1942	30	40	3,428,000	444	129	0.05
15	Bragstad	1943	44	40	41,108,500	549	1248	0.64
17	Bragstad	1943	36	40	7,187,000	262	457	0.11
18	Bragstad	1943	39	40	25,275,000	422	998	0.39
20	Bragstad	1944	37	40	80,873,000	2159	624	1.26
21	Bragstad	1945	35	40	179,892,000	3338	898	2.81
23	Bragstad	1950	34	40	15,082,000	146	707	0.23
24	Bragstad	1950	38	40	20,981,000	660	530	0.32
25	Bragstad	1951	35	40	35,320,700	1203	489	0.55
26	Bragstad	1951	34	40	93,944,100	2574	608	1.46
27	Bragstad	1954	39	40	89,571,100	2385	626	1.40
28	Bragstad	1956	40	40	179,863,900	2852	1051	2.81
29	Ranney	1956	41	13	39,357,000	252	2603	0.61
30	Ranney	1956	50	13	83,747,000	767	1819	1.30
31	Ranney	1957	48	13	357,807,600	2971	2007	5.59
32	Ranney	1957	41	13	297,276,000	2393	2070	4.64
33	Ranney	1957	38	13	116,496,000	1589	1222	1.82
36	Ranney	1974	40	16	13,005,000	131	1655	0.20
37	Ranney	1975	33	16	194,238,000	2464	1314	3.03
38	Ranney	1977	36	16	41,265,000	782	879	0.64
39	Ranney	1977	34	16	42,246,000	871	810	0.66
42	42" Gravel Pack	1978	41	2.6	46,258,100	1311	591	0.72
43	42" Gravel Pack	1978	40	2.6	28,117,500	759	617	0.43
44	42" Gravel Pack	1978	38	2.6	59,620,200	1625	611	0.93
45	42" Gravel Pack	1978	39	2.6	0	0	0	0.00
46	Ranney	1980	46	16	299,164,000	2964	1682	4.67
47	Ranney	1980	41	16	128,707,200	3115	689	2.01
DC1	Diversion Channel	1964			0	0	0	0.00
DC2	Diversion Channel	1968			0	0	0	0.00
34A	20" Gravel Pack	1988	41	1	34,124,000	1473	341	0.53
60	20" Gravel Pack	1988	40	1	31,885,300	850	625	0.49
61	20" Gravel Pack	1988	39	1	17,530,500	461	634	0.11
62	20" Gravel Pack	1988	38	1	7,570,300	199	634	0.11
63	20" Gravel Pack	1988	39	1	8,139,200	272	499	0.12
64	20" Gravel Pack	1989	44	1	5,570,800	309	300	0.08
65	20" Gravel Pack	1989	45	1	20,240,600	616	548	0.31
				Subtotal	2,687,995,600			41.68

Note: Well No. 45 has been abandoned.

TABLE 3–1. Summary of Sioux Falls, South Dakota Municipal Water Supply Well Data (1994) (continued)

Well ID	Type	Year Constructed	Depth (ft.)	Diameter (ft.)	Gallons Pumped (1993)	Hours Pumped (1993)	Pumping Rate (GPM)	Percent Of Total
48	20" Gravel Pack	1987	47	1	31,337,000	1,323	395	0.48
49	20" Gravel Pack	1987	45	1	58,701,000	1,843	531	0.91
50	20" Gravel Pack	1987	44	1	40,532,000	1,843	367	0.63
51	20" Gravel Pack	1987	43	1	22,529,000	1,553	242	0.35
52	20" Gravel Pack	1987	38	1	39,917,000	1,937	343	0.62
53	20" Gravel Pack	1987	49	1	37,110,000	1,276	485	0.58
54	20" Gravel Pack	1988	42	1	20,442,000	1,079	316	0.31
55	20" Gravel Pack	1988	44	1	34,859,000	2,110	275	0.54
56	20" Gravel Pack	1988	41	1	25,813,000	1,662	259	0.40
57	20" Gravel Pack	1988	45	1	59,627,000	2,694	369	0.93
58	20" Gravel Pack	1988	45	1	30,262,000	1,641	307	0.47
River Pump Station		1990			2,898,000,000		6733	45.30
				Subtotal	3,299,129,000			51.52
Wells Outside Big Sioux Aquifer								
66	20" Gravel Pack	1989	51	1	92,905,000	4,623	335	1.45
67	20" Gravel Pack	1989	122	1	124,096,100	7,209	287	1.93
68	20" Gravel Pack	1951	148	1	109,320,500	6,463	282	1.70
				Subtotal	326,321,600			5.08
		Total Treated Water			6,313,446,200			98

Note: Well No. 66 is located west of Sioux Falls in Skunk Creek Aquifer
Well Nos. 67 and 68 are located east of Sioux Falls in Split Rock Creek Aquifer

Table 3-2. Characteristics of the Big Sioux Aquifer in the Vicinity of SDANG, Joe Foss Field, Sioux Falls, South Dakota

Parameter	Municipal Well #15*	Municipal Well #23*
Aquifer Material	Glacial outwash-sandy gravel with traces of silt and clay.	Glacial outwash-sandy gravel with traces of silt and clay.
Saturated Thickness	21.12 feet	18.95 feet
Static Groundwater Depth (Elevation)	9.23 feet (1406.39 feet msl)	9.9 feet (1406.77 feet msl)
Transmissivity	68,579 gpd/ft	63,559 gpd/ft
Permeability	3,335 gpd/ft	3,325 gpd/ft

Source: HDR 1990.

* See Figure 3-4.

Groundwater Elevations - 1994

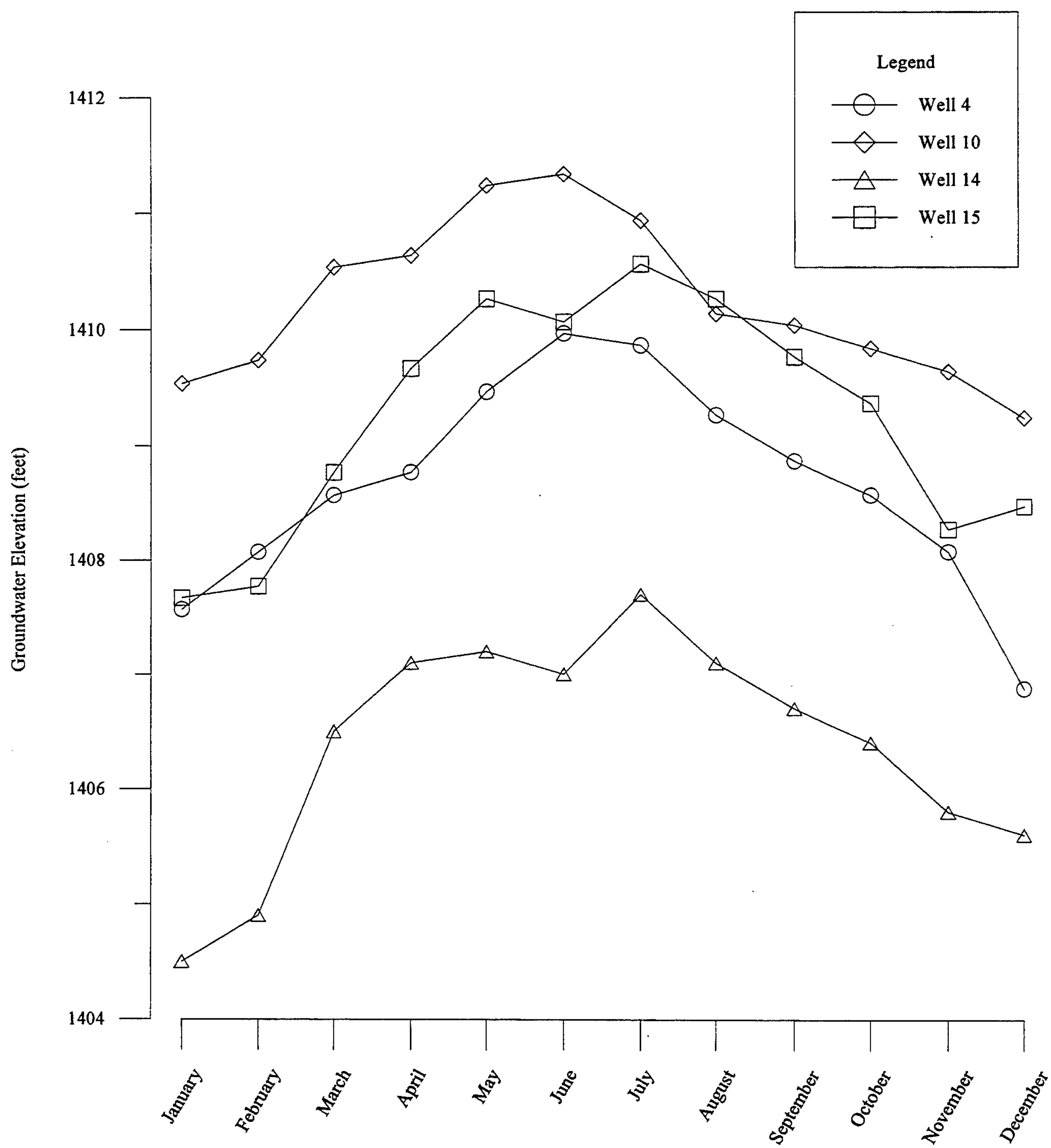

Figure 3-5. Hydrograph of Selected Municipal Wells

During piezometer and monitoring well installations within Sites 12 and 13, static water levels ranged from approximately 6 to 7 feet BLS, as shown in Figure 3-6. Flow direction determined using data from the three newly installed piezometers at Site 12, was to the southwest.

3.4 CRITICAL HABITATS/ENDANGERED OR THREATENED SPECIES

3.4.1 Wetlands

The U.S. Fish and Wildlife Service (USFWS) recognizes wetlands as vital resources for migratory waterfowl; therefore, wetlands are considered under USFWS's "no net loss of wetlands" policy. As part of the Federal Government's program to preserve and enhance the Nation's wetlands, the National Wetlands Inventory (NWI) project has developed maps of wetland types.

The NWI map of designated wetlands in the area of SDANG is presented in Figure 3-7. Table 3-3 describes the abbreviations used in the figure. Most of the wetlands near SDANG are temporary. Several of these small wetland areas are located near the Base Fire Training Area (Site 3). However, no wetlands have been identified in or around Sites 12 and 13.

Table 3-3. Descriptions of Wetland Designations for Sioux Falls, South Dakota Area

Wetland Designation	Description
PEMA	Palustrine, emergent, temporarily flooded
PEMAx	Palustrine, emergent, temporarily flooded, artificially excavated
R2UBGx	Lower perennial riverine, unconsolidated bottom, intermittently exposed, excavated

Source: U.S. Department of the Interior, Fish and Wildlife Service, South Dakota State Office (1989)

3.4.2 Endangered and Threatened Species

Information on rare and threatened species that may be found within or near the project area was obtained from the U.S. Department of the Interior (DOI) and the South Dakota Department of Game, Fish, and Parks. Table 3-4 lists these species and their environment of

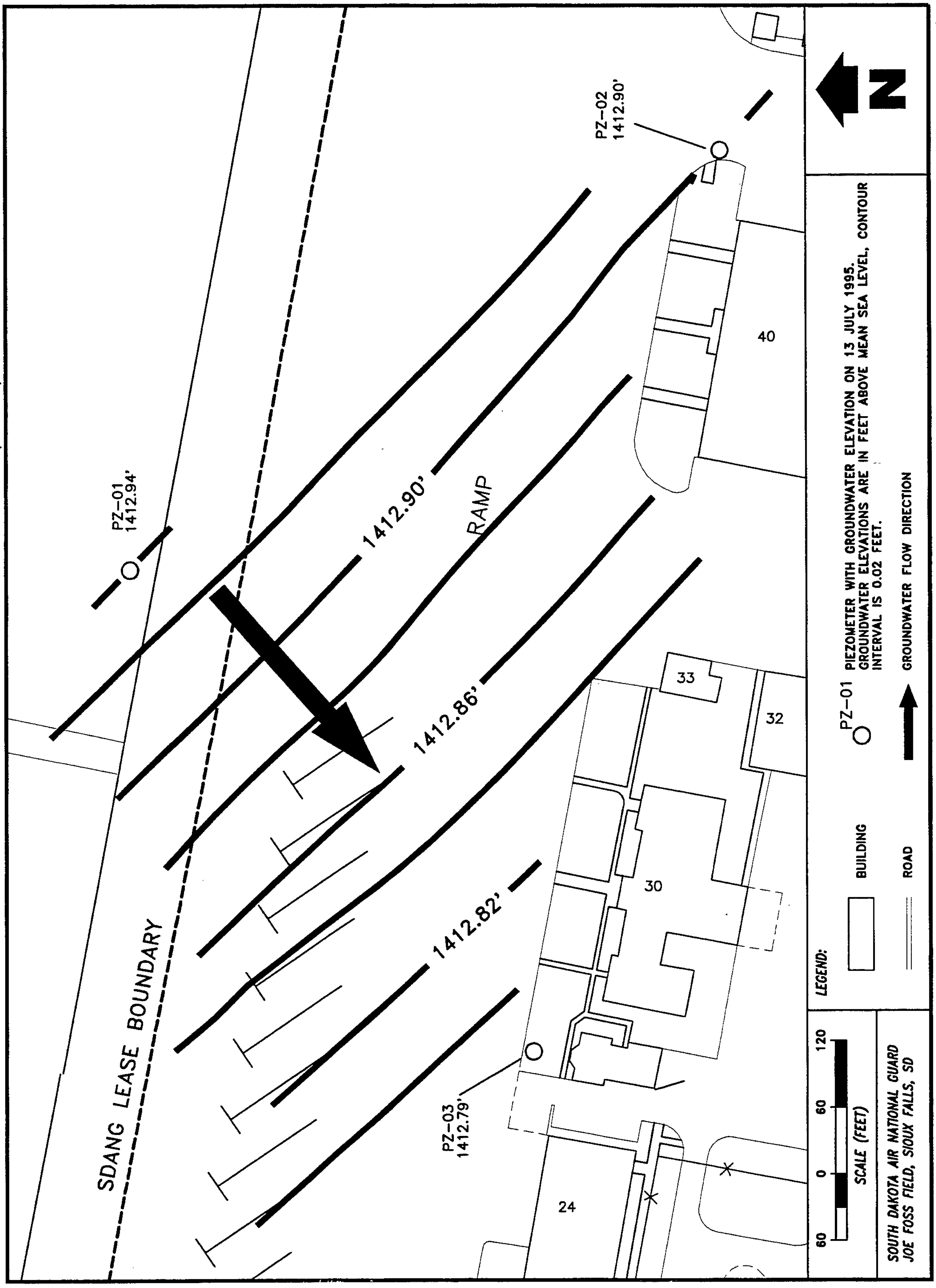

Figure 3-6. Groundwater Levels in Piezometers at Site 12 on 13 July 1995

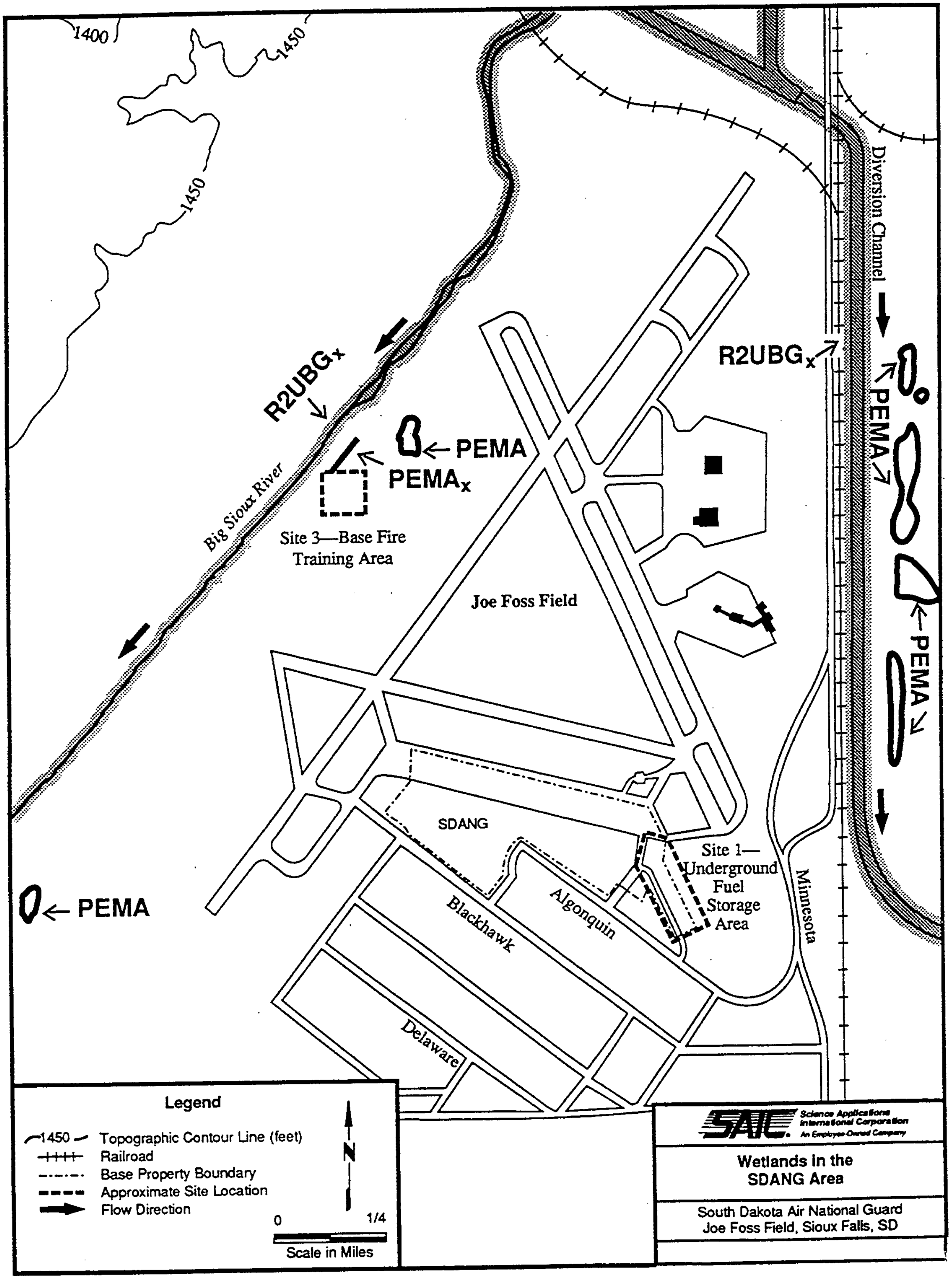

Figure 3-7. Wetlands in the SDANG Area

probable occurrence. The species consist of two prairie plants, an amphibian, and several species of migratory birds. There is no reason to expect that any of these bird species would be attracted to the site, since no critical habitats exist for these species in the vicinity of the site.

Table 3-4. Endangered Species Summary for the Greater Sioux Falls, South Dakota Area

Rare and Unique Species	Expected Occurrence
Bush Clover *Lespedeza Capitata*	Rare in South Dakota; occurs in native, tallgrass prairies
Compass Plant *Silphium Laciniatum*	Rare in South Dakota; occurs in native, tallgrass prairies
Blanding's Turtle *Emydoidea Blandingii*	State-threatened species; prefers calm, shallow waters, rich, aquatic vegetation, and sandy uplands for nesting
Federally Endangered Species	
Bald Eagle *Haliaeetus Leucocephalus*	Winters along the Missouri River
Peregrine Falcon *Falco Peregrinus*	Regarded as a migrant; usually associated with wetlands and open areas
Eskimo Curlew *Numenius Borealis*	A species associated with native prairies

Source: U.S. Department of the Interior, Fish and Wildlife Service, South Dakota State Office (1989) South Dakota Department of Game Fish and Parks (1989)

4. FIELD PROGRAM

This section summarizes the field activities conducted at Site 12 - Ramp Area and Site 13 - Motor Vehicle Maintenance Facility (MVMF) at the South Dakota Air National Guard (SDANG) as part of the Site Investigation (SI). The rationale and methods used for the geologic and hydrogeologic investigations, including field screening activities and the disposal of project-derived wastes, are discussed. An explanation of deviations of the field activities from those outlined in the approved SI Work Plan (SAIC 1995) is included. The results of the field activities are presented in Section 5.

4.1 GENERAL APPROACH

Field investigation methods used during the SI included a soil organic vapor (SOV or "soil gas") survey, subsurface soil and groundwater sampling using a hydraulic probe, and installation of piezometers and monitoring wells. Field screening activities were conducted to identify potential contaminant source areas. Local groundwater flow direction was estimated using water level elevations from piezometers installed during the SI. The screening results and groundwater flow direction were evaluated to determine the optimum locations of the monitoring wells. The following approach was used during the SI:

- An SOV survey was conducted at both sites to define potential contaminant source areas. Soil gas samples were collected at 2-foot intervals down to groundwater and screened onsite for total petroleum hydrocarbons (TPH), and benzene, toluene, ethyl-benzene, and xylenes (BTEX). At Site 13, soil gas samples also were screened for eight common solvents, including vinyl chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, 1,2-dichloroethene, tetrachloroethene, and carbon tetrachloride.
- At Site 13, 20 groundwater samples were collected using a hydraulic probe and screened in the onsite laboratory for TPH, BTEX, and eight common solvents.
- Soil samples were collected using a hydraulic probe. Two soil samples from each sampling location were selected for offsite laboratory analyses. Samples were chosen based on the screening results from each 2-foot interval. Soils were analyzed for TPH and BTEX; at Site 13, soil samples also were analyzed for eight common solvents.
- At Site 12, five groundwater samples were collected (one from each of the five soil sampling locations). These samples were analyzed at the offsite laboratory for TPH and BTEX.

- Three 2-inch diameter piezometers were installed to a depth of 15 feet below land surface (BLS). Groundwater flow direction was calculated using water level measurements from the piezometers.
- Five 4-inch diameter monitoring wells were installed at Site 12 to 15 feet BLS.
- One 2-inch diameter monitoring well was installed at Site 13 to 20 feet BLS. Groundwater samples were analyzed for TPH, BTEX, and eight common solvents.
- One sample was collected from each monitoring well boring for laboratory geotechnical testing (maximum depth of 15 feet).

4.2 FIELD ACTIVITIES

Field activities conducted as part of the SI at SDANG included an SOV survey, sampling soil and water using a hydraulic probe, onsite screening of samples, piezometer installation, and monitoring well installation and sampling. The following subsections present the methods and procedures for these activities. All field activities were documented in the field logbook (Appendix L). Results of all SI field activities are presented in Section 5.

4.2.1 Soil Organic Vapor Survey

An SOV survey was conducted at both sites to identify potential contaminant source areas. An electric hammer was used to core a 2-inch diameter hole through the concrete where necessary to initiate sampling activity. Prior to sampling, the SOV sampling equipment was purged with ambient air filtered through an organic vapor filter cartridge. Interconnected 3-foot lengths of 1-inch diameter steel pipe were then advanced to the appropriate sampling depth using a truck-mounted hydraulic probe. The bottom of the pipe was opened and a small diameter stainless steel probe attached to a length of Teflon® tubing was lowered through the steel casing to the bottom of the hole and screwed into a fitting at the bottom end of the pipe. The attachment to this fitting ensures that the sample comes from the soil at that interval and not from the inside of the steel pipe. In situ soil gas was withdrawn through the probe and used to purge the sampling equipment. A second sample of soil gas was withdrawn through the probe into a pre-evacuated, self sealing, U.S. Environmental Protection Agency (EPA)-approved clean glass vial at a pressure of two atmospheres. The glass vials were then taken to the onsite laboratory for analysis by gas chromatography (GC).

SOV samples were taken at 2-foot intervals, starting at 2 feet BLS, until groundwater was encountered. Samples were started at a depth of 2 feet BLS because of the thickness of the concrete at Site 12 and the asphalt at Site 13. Soil gas samples were collected to a maximum depth of 8 feet BLS. SOV survey results are presented in Appendix A.

4.2.2 Groundwater Field Screening

Groundwater samples at Site 12 were collected for offsite screening of BTEX and TPH (see Section 4.2.4). At Site 13, 20 groundwater samples were collected and screened onsite for BTEX, TPH, and eight common solvents. The truck-mounted hydraulic probe was used to advance interconnected 3-foot lengths of 1.25-inch diameter steel pipe into groundwater. The steel pipe was then replaced with a slotted 0.5-inch diameter polyvinyl chloride (PVC) temporary well point. Groundwater samples were collected with a stainless steel mini-bailer. Two to three 40-mL EPA-clean glass volatile organic analysis (VOA) vials were filled for each sample, depending on the productivity of the well. Samples were analyzed at the onsite laboratory.

4.2.3 Soil Field Screening

Soil samples were collected at Sites 12 and 13 using the hydraulic probe. The sampling team collected samples at 2-foot intervals until groundwater was encountered, according to direction from the Air National Guard Readiness Center (ANG) (see Section 4.6). Soil samples from each sampling interval were screened at the onsite laboratory (TARGET) using the GC. Using data from the screening analyses, two samples were selected from each sampling point, for analysis by the offsite laboratory (Maxim Technologies, Inc., formerly Huntington Engineering and Environmental, Inc.).

Soil samples were collected by hydraulically driving a 1.25-inch-diameter piston-type sampler to the top of the desired sample interval. The piston within the sampler was then removed and the sample corer was advanced to collect a 2-foot core. The soil core was contained in a non-reactive plastic liner. The liner was opened and screened for volatile organic compounds (VOCs) with a photoionization detector (PID). Geologic characteristics were described on boring logs (the boring logs are presented in Appendix B). Soil was removed from the liner and placed in the appropriate sample containers. The samples were placed in a cooler

with ice until they could be analyzed by the onsite laboratory. Two samples from each point were sent to the offsite laboratory. Sample selection was based on the onsite laboratory screening results; samples with the highest concentrations of contaminants were sent to the offsite laboratory for analysis. If contaminants were not detected in any samples from a given location, the first and last sample intervals were sent for offsite laboratory analysis.

4.2.4 Groundwater Screening

Groundwater samples were collected at the same locations as the soil samples at Site 12, with the hydraulic probe. Interconnected 3-foot lengths of 1.25-inch-diameter steel pipe were advanced 5 feet below the groundwater interface to ensure a sufficient supply of groundwater and allow samples to be collected. Once the sampling depth was achieved, the pipe was raised 2 feet to expose the stainless steel screen. Teflon® tubing was inserted down the inside of the pipe to the screened interval. The Teflon® tubing was equipped with a stainless steel bottom check valve. By raising and lowering the tubing at the surface, groundwater was drawn up into the tubing to the surface, approximately 8 feet, where the groundwater was collected directly into the appropriate sample containers. The samples were placed in a cooler with ice and sent to the offsite laboratory for analysis. These samples were analyzed for TPH and BTEX.

4.2.5 Piezometer Installation

The three piezometers were installed using a hollow-stem auger. Continuous-flight hollow-stem augers were operated from a truck-mounted drilling rig. The augers were rotated to advance the boring and lift the formation materials (cuttings) to the surface. After drilling to the target depth of 15 feet BLS with the auger, the piezometers were installed. The piezometers were constructed of 2-inch diameter, flush threaded, schedule 40 PVC casing and screens with a 0.010-inch slot that meet ANG and State of South Dakota well construction standards. Each piezometer was completed with a 10-foot screen installed 2 feet above the water table.

The sand pack surrounding the piezometer extended from 1 foot below the bottom to 1 foot above the top of the piezometer screen. Tremie pipe conveyed properly sized, clean, bagged silica sand to the annulus. A 2-foot bentonite seal was placed above the sand pack. The

remainder of the annulus was filled with cement grout to the surface to prevent the vertical flow of water along the casing.

All piezometers were finished flush with the land surface. The PVC casing was cut 2 to 3 inches BLS and completed with a protective locking cap consisting of a cast-iron valve box assembly. The valve box was placed in the center of the hole. Each piezometer was fitted with a water-tight compression casing cap to prevent surface water infiltration. The piezometer number was clearly marked on each valve box lid and well casing. All piezometer assemblies were secured with keyed-alike brass or stainless steel locks. Construction diagrams for all piezometers are presented in Appendix C.

4.2.6 Monitoring Well Installation

Monitoring wells were installed using a hollow-stem auger. Monitoring wells were constructed of 4-inch inside diameter (ID), flush threaded, schedule 40 PVC casing and 0.010-inch slotted screens that meet ANG and State of South Dakota well construction standards. Monitoring wells were completed to a depth of 15 feet BLS. Each monitoring well was constructed with 2 feet of the 10-foot screen above the water table.

The sand pack surrounding the monitoring well extended from 1 foot below the bottom of the monitoring well screen to 1 foot above the top of the screen. A 2-foot bentonite seal was placed above the sand pack. The annulus above the bentonite seal was filled with cement grout to the surface to prevent the vertical flow of water along the casing.

All monitoring wells were finished flush with the land surface. The casing was cut 2 to 3 inches BLS and installed with a protective locking cap consisting of a cast-iron valve box assembly. The valve box was placed in the center of the hole with the top flush with the ground surface. Each monitoring well was fitted with a water-tight compression casing cap to prevent surface water infiltration. Each monitoring well number was clearly marked on the valve box lid and well casing. All monitoring wells were secured with keyed-alike brass locks. Construction diagrams for monitoring wells are presented in Appendix D.

4.2.7 Monitoring Well Development

The monitoring wells were developed within 24 to 48 hours of installation in accordance with the SI Work Plan (SAIC 1995). This interval allowed sufficient time for the grout to set. Each monitoring well was developed by surging and pumping until well water was clear and free of sand, and until specific conductivity, temperature, and pH measurements had stabilized. A calibrated meter was used to measure the temperature, pH, and specific conductivity. The development water was contained until approval for discharge to the sanitary sewer could be obtained from the city of Sioux Falls Environmental Compliance Manager. Well development forms are provided in Appendix K.

4.2.8 Monitoring Well Sampling

Prior to sampling, all wells were purged a minimum of five well volumes with a stainless steel submersible pump or a disposable polypropylene bailer in accordance with the SI Work Plan (SAIC 1995). Temperature, pH, and specific conductivity were measured at regular intervals as well volumes were removed. When three consecutive measurements were stable, purging was considered complete.

Groundwater samples were collected immediately after purging, using a disposable polypropylene bailer lowered into the well on a nylon rope. The groundwater was dispensed directly from the bailer into sample bottles containing a hydrochloric acid preservative. The samples were immediately placed into a cooler with ice (Appendix F provides the chain-of-custody forms that document the transfer of samples). The bailer and length of rope were disposed of after each sample was collected. The submersible pump and water level indicator were decontaminated in accordance with the SI Work Plan before each use (SAIC 1995). Appendix K provides the field sampling forms that document groundwater sampling activities.

4.3 SI PROGRAM AT SITE 12 - RAMP AREA

The SI program at Site 12 - Ramp Area included an SOV survey, soil sampling using a hydraulic probe, collection of groundwater screening samples, piezometer and monitoring well

installation, and monitoring well sampling. The suspected contaminants at Site 12 included TPH and BTEX. Investigation results for Site 12 are presented in Section 5.1.

4.3.1 SOV Survey

Fifty SOV sampling locations were established at Site 12, as shown in Figure 4-1. Thirty-five points were placed on a grid 300 by 200 feet with a 50-foot spacing between points. This grid encompasses the previously excavated Areas 1 and 2. Some of the grid points had to be relocated in the northeast corner because a water pipe was present at shallow depth beneath Site 12. The city of Sioux Falls confirmed the location of the water line and requested that SOV sampling be conducted at least 20 feet away from the pipe's marked location.

Based on the screening results of the original 35 SOV points, 15 points were added to better define the potential contaminant source areas. Four additional points were located around point GS12-11, where total xylenes were detected (the concentration was below reporting limits). Eleven additional points were located around GS12-19, which was the only other point of the original 35 where contaminants were detected. Additional points were first located 25 feet from GS12-11 and GS12-19. If contaminants were not detected at this position, another sample was taken 12.5 feet from the original location where contaminants were detected. Contaminants were detected west of GS12-19, at grid point GS12-37. One additional sample was collected 12.5 feet to the west of GS12-19. Two samples were taken 25 feet from GS12-37, one to the north and one to the south. Three SOV sampling points were located 50 feet east of GS12-19—one point was located directly east, and the other two were located 25 feet north and south of GS12-19. A buried water line 25 feet east of GS12-19 interfered with SOV sampling at that location.

At each sampling point, three SOV samples (at 2, 4, and 6 feet BLS) were collected. The first sample was collected at a depth of 2 feet BLS due to the thickness of the concrete (8 to 16 inches) and the gravel underneath. Groundwater was encountered at approximately 7 feet BLS, which prevented SOV sampling at depths below the 6-foot interval. The SOV survey results are discussed in their entirety in Appendix A.

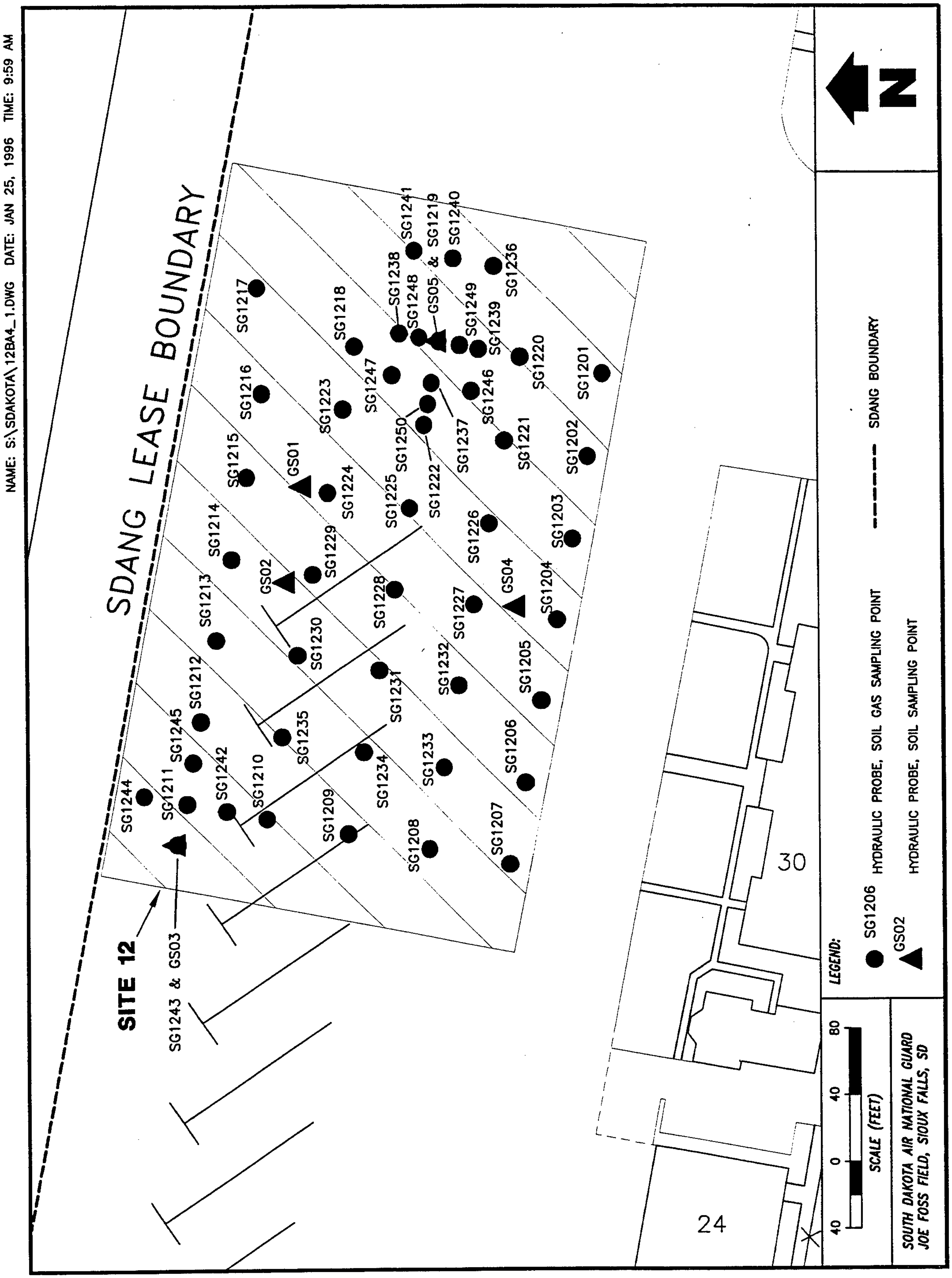

Figure 4-1. Field Screening Sampling Points at Site 12

4.3.2 *Soil and Groundwater Screening*

Based on the findings of the SOV survey and the historical groundwater flow direction, five soil sampling points were located at Site 12, as shown in Figure 4-2. Soil samples were collected as described above, at 2-foot intervals until groundwater was encountered (2 to 4, 4 to 6, and 6 to 8 feet BLS). The 0- to 2-foot interval sample was not collected because concrete (up to 16 inches thick) and the underlying gravel occupied this entire interval. One soil sample was collected at each interval for screening by the onsite laboratory. The screening data were used to select samples for analyses by the offsite laboratory. Two samples from each of the five locations were sent to the offsite laboratory (10 soil samples total at Site 12). Soil results for Site 12 are presented in Section 5.1 and Appendix A.

Groundwater screening samples were collected for offsite laboratory analysis of BTEX and TPH. Temporary well points were installed at the same five sampling locations used for soils (Figure 4-2). Samples were then collected as described in Section 4.2.4. Five groundwater samples and a duplicate were sent to the offsite laboratory. Site 12 groundwater screening results are presented in Section 5.1.

4.3.3 *Piezometer Installation*

Three piezometers were installed to provide information on groundwater flow direction. Piezometer PZ-01 is located north of Building 33, north of the ramp and the taxiway. PZ-02 is located northeast of Building 40. PZ-03 is located north of Building 36. The latter two piezometers are in the grassy area between the buildings and the ramp (see Figure 3-6). Groundwater was encountered at approximately 7 feet BLS, which is unusually high compared to groundwater elevations measured in previous months at the city of Sioux Falls production wells. The piezometer boring was drilled to 16 feet BLS. The 10-foot screen was placed between 5 and 15 feet BLS, and the sand pack was placed between 4 and 16 feet. One foot of sand was placed above the screen because of the high water level. A 2-foot bentonite seal, followed by 1 foot of grout, filled the remainder of the annulus in each piezometer. A surface pad and protective cover were installed and clearly marked, as shown in the construction diagrams presented in Appendix C.

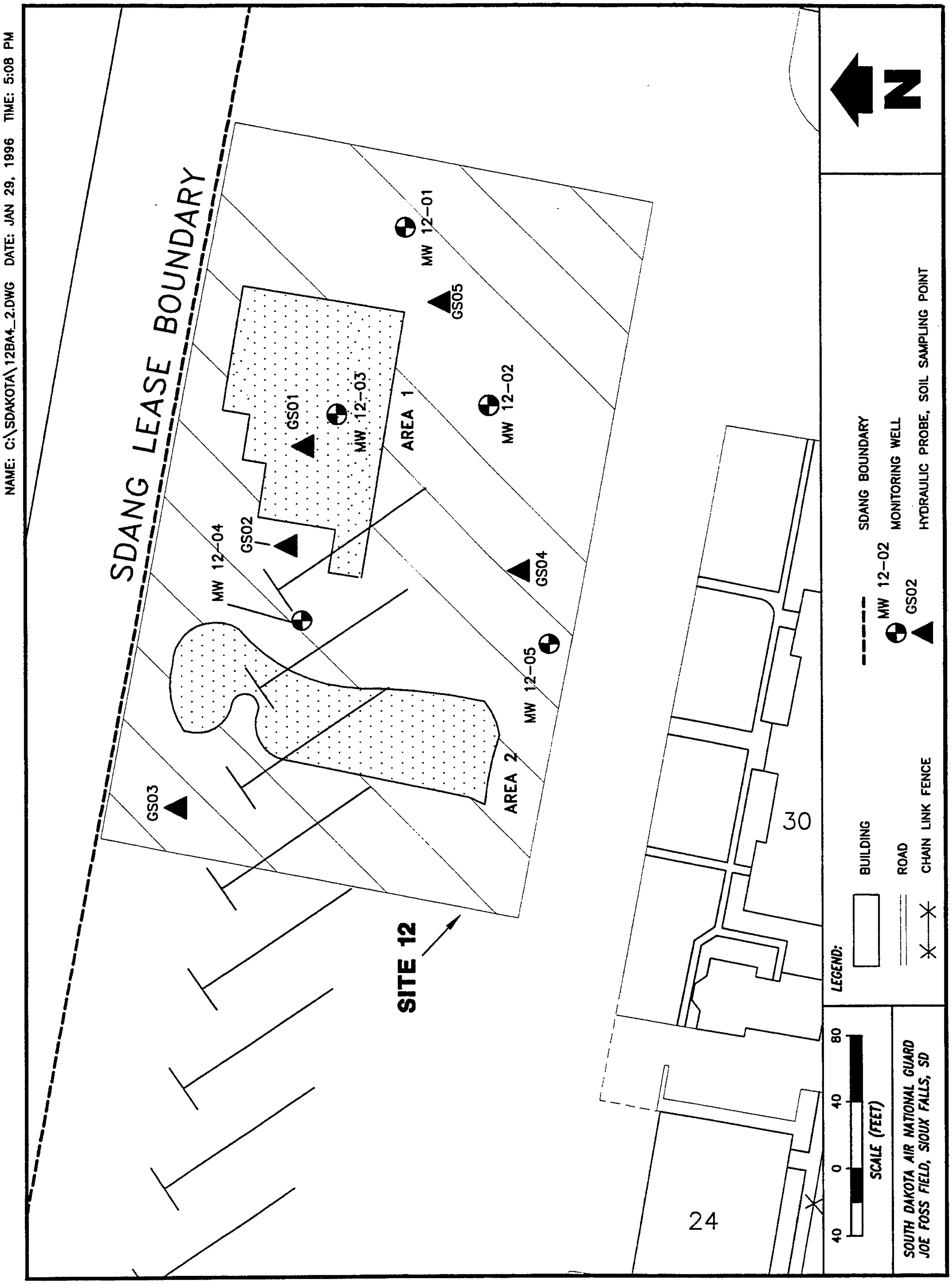

Figure 4-2. Sampling Points at Site 12

Water levels were measured during monitoring well sampling using an electronic sounder. Water level measurements indicate that the groundwater flow direction is to the southwest. Historically, in the vicinity of Site 12, groundwater flow direction has been to the southeast or northwest, possibly induced by pumping at nearby municipal wells. The observed change in flow direction is thought to be the result of the removal of the influence of nearby production wells, since these wells are no longer in use for production.

4.3.4 Monitoring Well Installation and Sampling

Five wells were installed at Site 12, both downgradient and upgradient of the suspected contaminant source areas and the excavated Areas 1 and 2 (see Figure 4-2).

All monitoring wells were installed in the same manner. The boreholes for the wells were drilled to 16 feet BLS. One geotechnical soil sample was collected from each of the monitoring well borings (see Appendix J). The well screen extended from 5 to 15 feet BLS. The sand pack extended from 4 to 16 feet BLS. As with the piezometers, the bentonite seal was placed from 2 to 4 feet BLS and the grout was placed from 1 to 2 feet BLS. Well completion diagrams are presented in Appendix D.

Well development and purging was conducted as described in Section 4.2.8. Five groundwater samples were collected at Site 12 according to the procedures described in Section 4.2.

4.4 SI PROGRAM AT SITE 13 - MVMF

The SI program at Site 13 - MVMF included an SOV survey, soil and groundwater sampling using a hydraulic probe, monitoring well installation, and groundwater sampling. The suspected contaminants at Site 13 included TPH, BTEX, and eight common solvents, including vinyl chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, 1,2-dichloroethene, tetrachloroethene, and carbon tetrachloride. The investigation results for Site 13 are presented in Section 5.2.

4.4.1 SOV Survey

Six SOV survey locations were established at Site 13, as shown in Figure 4-3. Four samples were collected at each point: one each at 2, 4, 6, and 8 feet BLS. Groundwater was encountered at approximately the 8-foot interval, which prevented SOV sampling beyond this depth. Four SOV points were arranged around the pump island (one each to the north, south, east, and west). A fifth survey point was located above the underground fuel lines that supply the pumps. A sixth survey point was located between the protective posts on the south side of the island, where odors were first discovered by construction workers digging the post holes. The SOV survey results are discussed in their entirety in Appendix A.

4.4.2 Groundwater Screening

Twenty groundwater screening samples were collected and analyzed by the onsite laboratory for TPH, BTEX, and solvents. Groundwater sampling locations were established using a 10-foot grid system around the pump island and fuel lines, as shown in Figure 4-3. The hydraulic probe was used to insert a temporary well point whereby groundwater could be sampled. The groundwater analyses results at Site 13 are discussed in Section 5.2.3 and presented in Appendix A.

4.4.3 Soil Screening

Based on the results of the SOV and groundwater survey, four soil sampling locations were chosen at Site 13, as shown in Figure 4-4. At each point, samples were collected at four depths: 3 feet, 3 to 5 feet, 5 to 7 feet, and 7 to 9 feet BLS. Groundwater was encountered at approximately 9 feet BLS in this area. Samples were not collected below the water table. Two sets of samples were collected: one for the onsite laboratory and one for the offsite laboratory. After the screening sample was analyzed by the onsite laboratory, two samples per location were selected for offsite analysis. Samples with the highest concentrations of contaminants at every location were analyzed by the offsite laboratory. If the screening samples did not exhibit contamination, the first and last sample intervals were sent for offsite laboratory analyses. A minimum of two samples per location (a total of eight samples) were sent for offsite analysis from Site 13. The soil analyses results are discussed in Section 5.2.2.

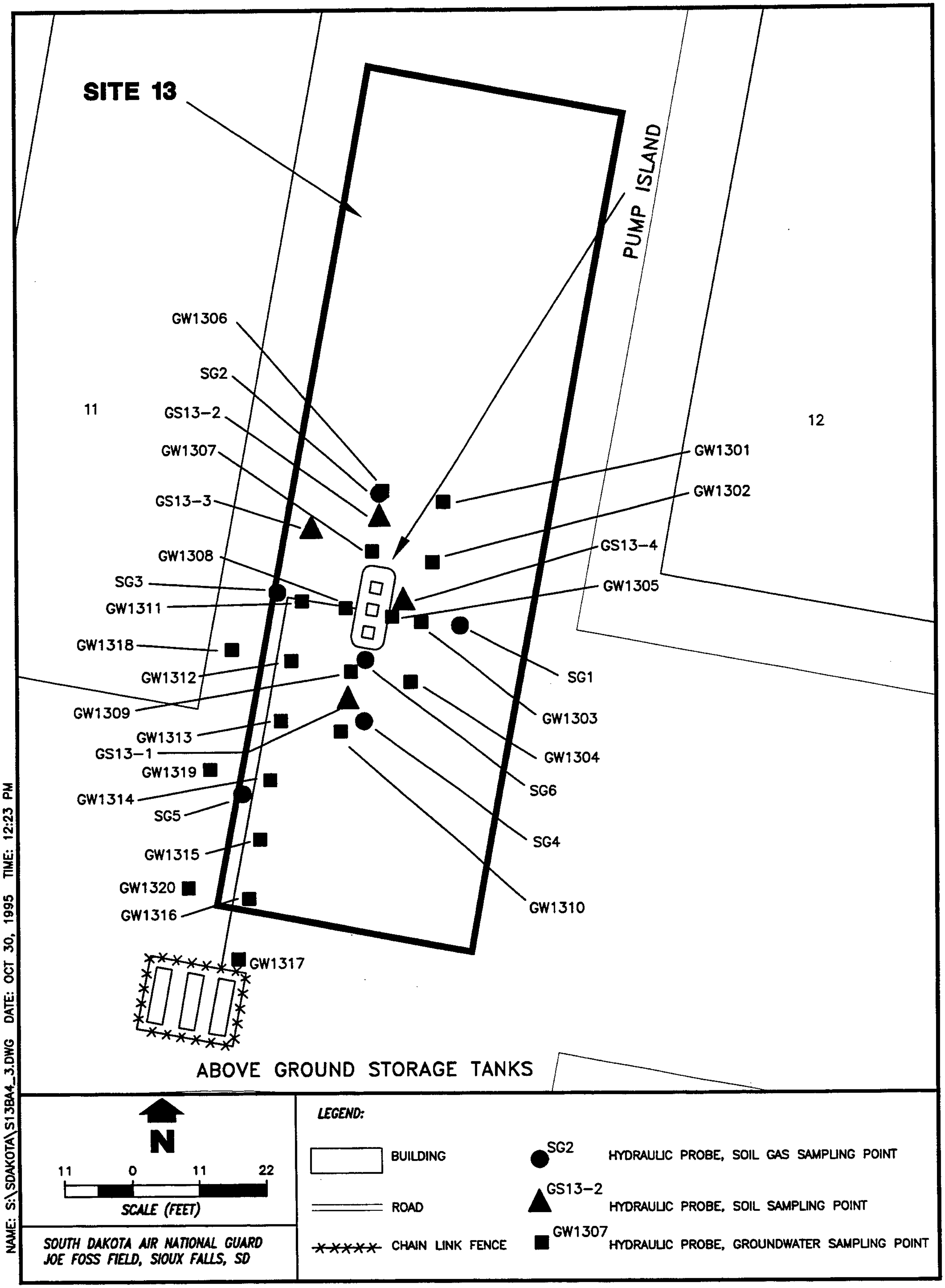

Figure 4-3. Field Screening Sampling Points at Site 13

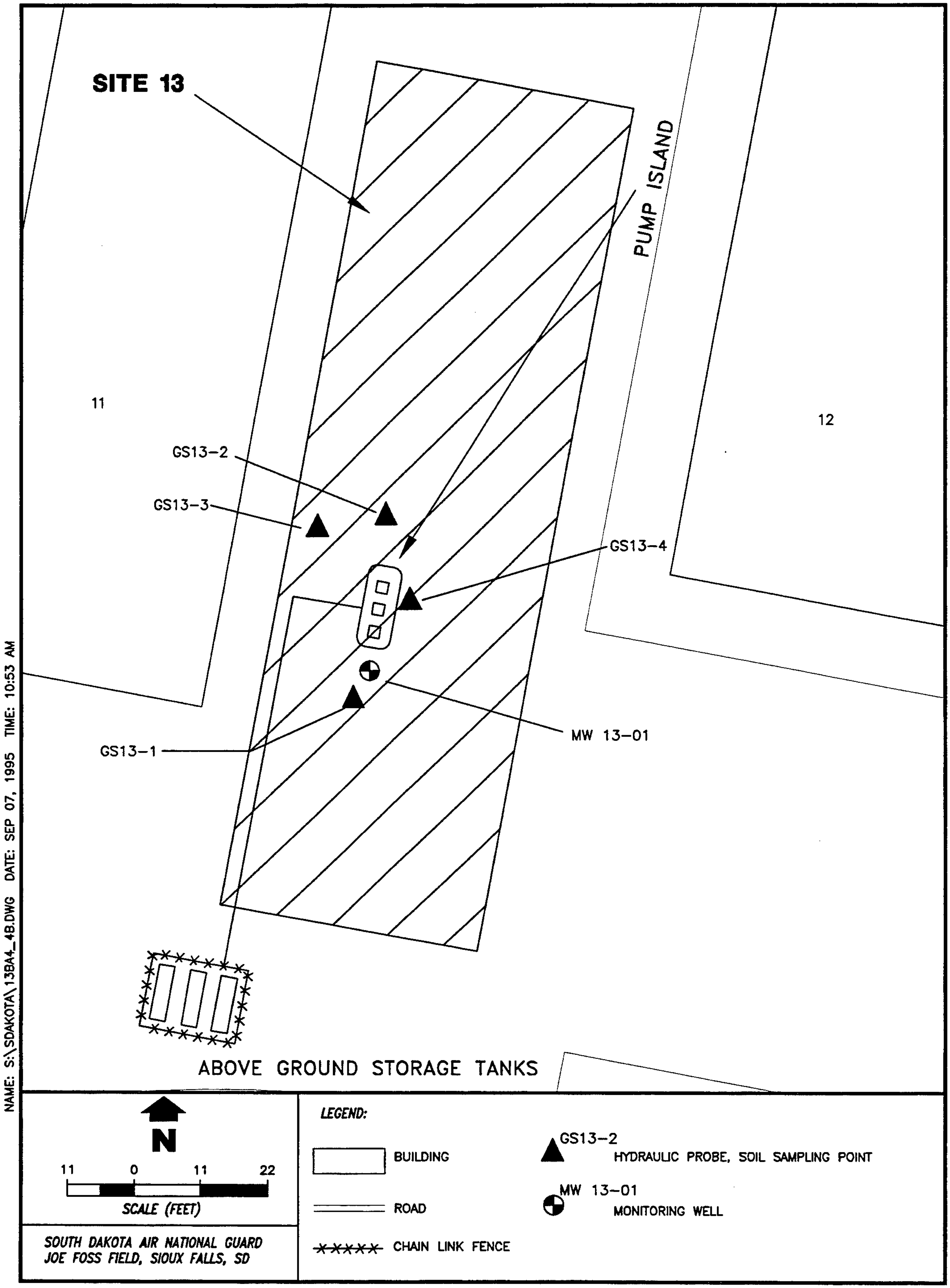

Figure 4-4. Sampling Points at Site 13

4.4.4 Monitoring Well Installation

One 2-inch PVC monitoring well was installed at Site 13, downgradient (southwestward) from the suspected contaminant source area. The hydraulic gradient at Site 13 is assumed to be similar to that observed at Site 12, based on the similarities in topography, geology, and the short distance between the two sites. Monitoring well MW1-13 was located at the south end of the pump island between the two protective posts, as Figure 4-4 shows. Groundwater flow is to the southwest, and MW13-1 was placed to intercept any contamination migrating from the south end of the pump island. The well boring was drilled to 20 feet BLS and completed as shown in Appendix D. A geotechnical soil sample was collected from the well boring. The geotechnical data are presented in Appendix J.

4.4.5 Monitoring Well Sampling

Well development and purging proceeded as described in Section 4.2. One groundwater sample and one duplicate sample were collected from well MW13-1.

4.5 INVESTIGATION-DERIVED WASTE HANDLING

Investigation-derived waste (IDW) for the SI at Sites 12 and 13 were handled and disposed of in accordance with state and local regulations by the SDANG Base Office of Civil Engineering.

SDANG received permission from the Utilities Department's Environmental Compliance Manager to discharge well development water into the city of Sioux Falls sanitary sewer. The conditions of the approval were as follows; 1) the volume shall not exceed 2,500 gallons, 2) the water must be placed in a container and monitored before it is discharged, 3) the wastewater must be discharged into a designated manhole, and 4) the wastes must be discharged on July 17 and 18, 1995 (see Appendix H). Approximately 1,100 gallons were discharged to the sanitary sewer. The water was pumped from the wells into a tank; no sheen was visible and the PID did not detect VOCs in the water. Well development water was discharged into the designated manhole on the dates specified.

Nineteen drums of soil cuttings were generated during piezometer and monitoring well installation. These drums were staged behind Building 47 on the blacktop parking area. The disposition of these drums was completed on August 31, 1995, following review of the soil sample analyses results. All drums were labeled to define the contents, soil borings from which the cuttings originated, and dates filled. Soil cuttings were disposed of along the airport perimeter road south of Building 10.

4.6 DEVIATIONS FROM WORK PLAN

Deviations from the approved SI Work Plan (SAIC 1995) resulted in minor impacts to the scope and method of accomplishing the field program. No deviation had an impact on defining the nature and extent of contamination at Sites 12 and 13, or on data quality. All deviations were documented on field change order forms for approval by ANG (see Appendix M).

The approved SI Work Plan (SAIC 1995) specified 300 SOV samples at Site 12 and 25 SOV samples at Site 13. Because groundwater was present at depths of 7 and 9 feet BLS at Sites 12 and 13, respectively, SOV samples could not be collected at all of the proposed depth intervals. At Site 12, 152 SOV samples were collected and 24 SOV samples were collected at Site 13.

At the request of ANG, five hydraulic probe sampling points were sampled at Site 12 instead of the eight points proposed in the SI Work Plan (SAIC 1995).

At Site 12, five 4-inch monitoring wells were installed. The SI Work Plan (SAIC 1995) specified four wells in this area. This change was made at the request of ANGRC to better characterize the nature and extent of contamination at the site. Two 2-inch monitoring wells were specified in the SI Work Plan for Site 13 (SAIC 1995). Only one well was installed at the request of ANG. This decision was based on SOV and field screening results in which no major contamination was detected at the site.

Monitoring wells were completed at 15 feet BLS because of high groundwater levels instead of the proposed depth of 25 feet specified in the SI Work Plan (SAIC 1995). This change was made at the request of ANG. A related change was the completion of monitoring wells and piezometers with the sand pack extending 1 foot instead of 2 feet above the screen. This modification was made when shallower wells and piezometers were requested.

All monitoring wells were sampled using disposable polypropylene bailers rather than the reusable stainless steel bailers specified in the SI Work Plan (SAIC 1995). This change resulted in reducing the volume of decontamination fluids to be disposed of, and reduced the potential for cross-contamination of wells using incompletely decontaminated bailers.

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5. SITE INVESTIGATION RESULTS

This section presents the results of the Site Investigation (SI) at Site 12 - Ramp Area and Site 13 - Motor Vehicle Maintenance Facility (MVMF). All data presented in this section have been validated according to U.S. Environmental Protection Agency (EPA) guidance and the Quality Assurance Project Plan (QAPP) prepared for this SI. This includes the field screening data and laboratory data for soil and groundwater samples. Soil and groundwater screening data were collected in order to identify the optimum locations for monitoring wells, and are not comparable in quality to the data from the environmental and quality control (QC) samples. Both field and laboratory analytical data have been evaluated for precision, accuracy, representativeness, comparability, and completeness (PARCC). Analytical results from the offsite laboratory (Maxim Technologies, Inc.) are provided in Appendix E. The quality of these data is considered acceptable for the purposes of this investigation. The data quality assessment is presented in Appendix J.

5.1 SITE 12 - RAMP AREA RESULTS

5.1.1 Screening Activity Results

The results of the soil organic vapor (SOV) survey and hydraulic probe activities are contained in Appendix A. The screening data indicated contamination in subsurface soils east of Area 1. Groundwater screening samples did not exhibit contamination with either benzene, toluene, ethylbenzene, and xylenes (BTEX) or total petroleum hydrocarbons (TPH).

5.1.1.1 SOV Survey

TPH, ethylbenzene, and xylenes were detected in soil gas samples immediately east of Area 1. The maximum concentrations of these analytes were 391.7 micrograms per liter-volume (μg/L-v) TPH (4 feet BLS), and 59.2 μg/L-v xylenes (4 feet BLS). These maximum concentrations were all located at SOV point 19, approximately 50 feet due east of the Area 1 boundary, as shown in Figure 5-1. The maximum concentration of 19.37 μg/L-v ethylbenzene (2 feet BLS) was located at SOV point 50, approximately 12.5 feet due east of the Area 1 boundary. TPH and xylene contamination in soils, indicated by soil gas results, appears to be most widespread in the 6-foot sampling interval. No contaminants of interest were detected in

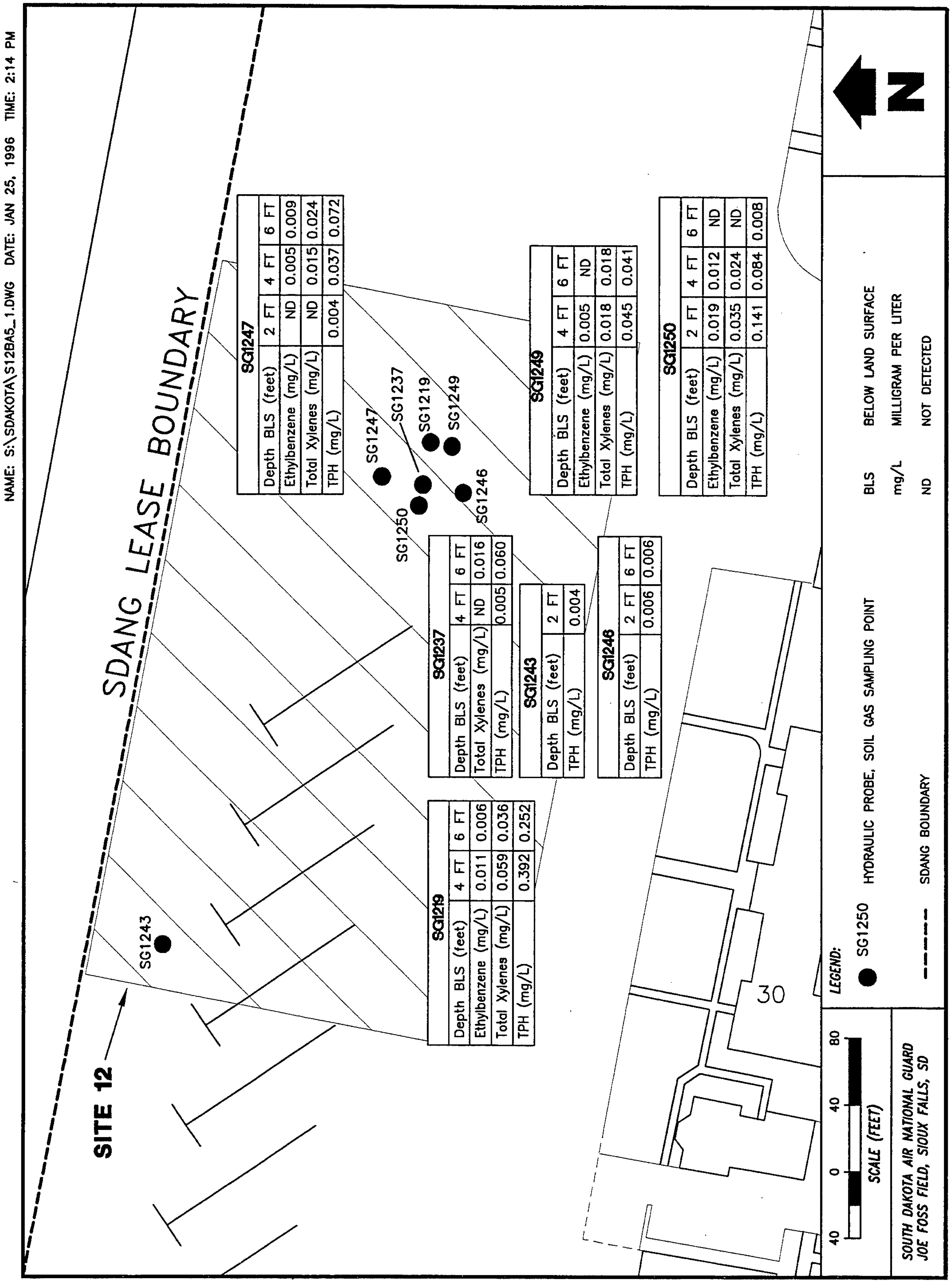


Figure 5-1. Summary of Site 12 Soil Gas Field Screening Results

the SOV samples located east of the buried water line that lies to the east of Area 1. No detectable amounts of the contaminants of interest were found during the SOV survey in the sampling locations to the north, south, or west of Area 1. Table 5-1 (page 5-4) summarizes the results of the SOV survey at Site 12.

5.1.1.2 Soil Screening

Five sampling locations at Site 12 were screened for TPH and BTEX. BTEX compounds were not detected in any of the samples. TPH was detected at GS05, in both the 4- and 6-foot intervals, at 5 and 10 mg/kg, respectively, as shown in Figure 5-2. TPH also was detected in the 2-foot interval at GS03, at 10 mg/kg. Table 5-2 summarizes the soil field screening results for Site 12.

Table 5-2. Site 12 Soil Field Screening* Summary of Results

Parameter	Detection Limit	GS03-1 (2-4 ft)	GS05-2 (4-6 ft)	GS05-3 (6-8 ft)
Benzene	0.1 mg/kg	ND	ND	ND
Toluene	0.1 mg/kg	ND	ND	ND
Ethylbenzene	0.1 mg/kg	ND	ND	ND
Total Xylenes	0.1 mg/kg	ND	ND	ND
TPH	5 mg/kg	10	5	10

* Analyzed by onsite laboratory.

Note: Refer to Figure 5-2 for sample locations.

5.1.1.3 Groundwater Screening

Groundwater screening was conducted at Site 12 at the same locations as the soil screening sampling points. Samples were collected using the manual positive displacement method described in Section 4. The samples were sent to the offsite laboratory for BTEX and TPH analyses. TPH as gasoline was detected at 70 μg/L in GW12-6, a duplicate of GW12-5, but not in GW12-5. No other contaminants were detected.

Table 5-1. Site 12 Soil Organic Vapor Survey Summary of Results

Parameters	Detection Limit	SG12 19-2	SG12 19-3	SG12 37-2	SG12 37-3	SG12 43-1	SG12 46-1	SG12 46-3	SG12 47-1	SG12 47-2	SG12 47-3	SG12 49-2	SG12 49-3	SG12 50-1	SG12 50-2	SG12 50-3
Benzene	4.00μg/L of Air	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	4.00μg/L of Air	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	4.00μg/L of Air	10.56	6.36	ND	ND	ND	ND	ND	ND	5.0	8.94	4.69	ND	19.37	11.79	ND
Total Xylenes	4.00μg/L of Air	59.20	36.00	ND	16.17	ND	ND	ND	ND	14.7	24.10	18.16	17.69	34.86	23.63	ND
TPH	4.00μg/L of Air	391.73	251.93	5.03	60.26	4.07	6.34	6.20	3.84	37.2	71.99	44.60	40.71	141.16	83.70	8.42

Refer to Figure 5-1 for sample locations.

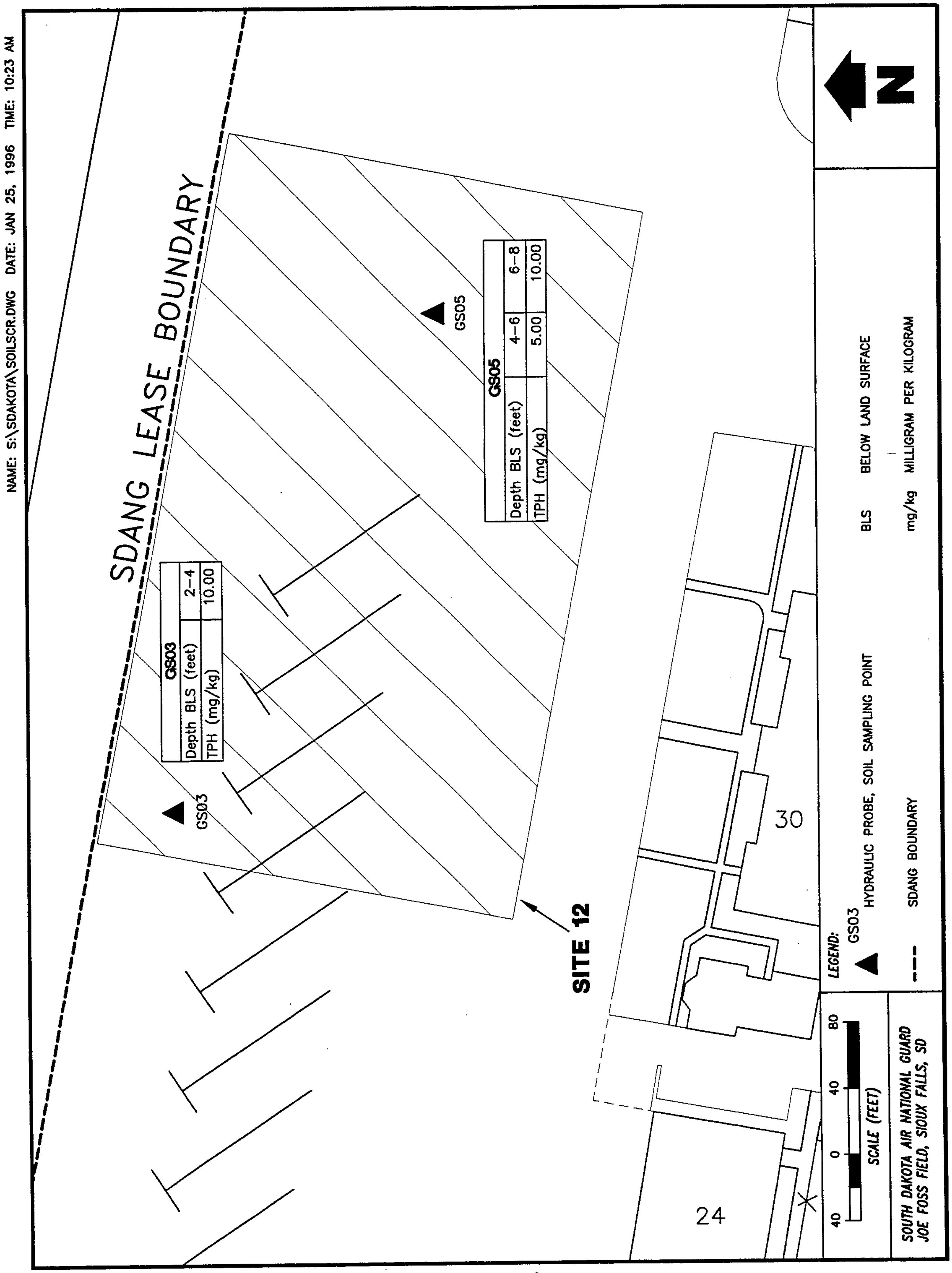


Figure 5-2. Summary of Site 12 Soil Field Screening Results

5.1.2 Soils

Subsurface soil samples were collected at five locations at Site 12 for offsite laboratory analyses of BTEX and TPH. TPH as gasoline was detected in samples GS05-3 (6 to 8 feet BLS) and GS06-2 (4 to 6 feet BLS, a duplicate of GS05), at concentrations of 94 and 10 μg/kg, respectively, as shown in Figure 5-3. Both of these measurements indicated higher boiling-point hydrocarbons that are not typical of gasoline. The sampling location is the easternmost of the five points. No other TPH or BTEX compounds were detected in soil samples at Site 12. Table 5-3 summarizes the concentrations of TPH and BTEX detected in the soil at Site 12.

Table 5-3. Site 12 Soil* Summary of Results

Parameter	MDL	GS05-3 (6-8 ft BLS)
Benzene	1 μg/kg	ND
Toluene	1 μg/kg	ND
Ethylbenzene	1 μg/kg	ND
Total Xylenes	1 μg/kg	ND
TPH	7 μg/kg	94 μg/kg (0.094 ppm)

* Analyzed by offsite laboratory.
MDL - Method Detection Limit.
Note: Refer to Figure 5-3 for sample locations.

5.1.3 Groundwater

Groundwater samples were collected from the five monitoring wells installed at Site 12 (MW12-1, MW12-2, MW12-3, MW12-4, and MW12-5). Samples were analyzed for BTEX and TPH. TPH as gasoline was detected at MW12-1 at concentrations of 81 μg/L, and 340 μg/L as shown in Figure 5-3. TPH or BTEX were not detected in any other groundwater sample. Table 5-4 summarizes these results.

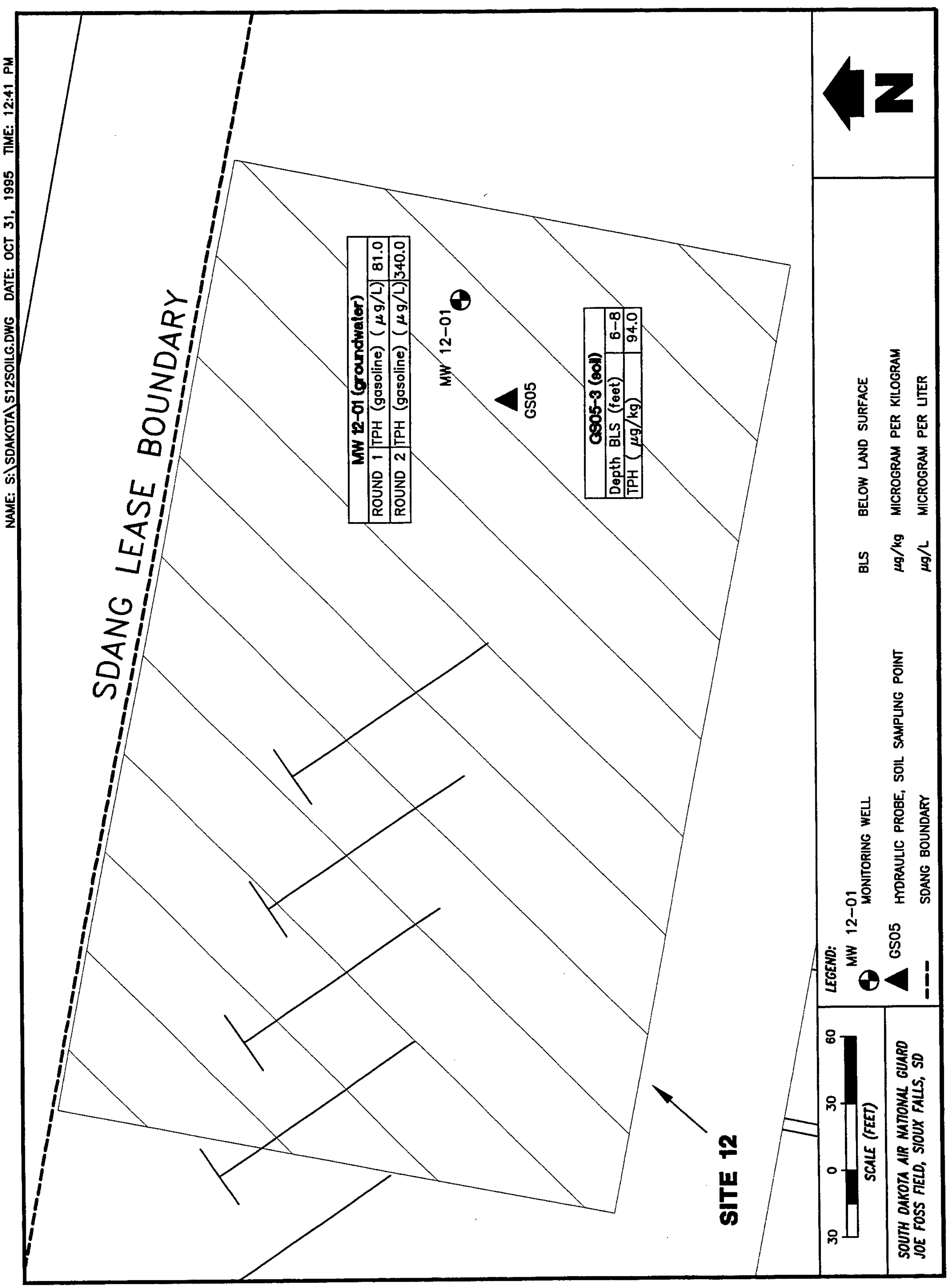


Figure 5-3. Summary of Site 12 Soil and Groundwater Results

Table 5-4. Site 12 Groundwater* Summary of Results

Parameter	MDL	MCL	MW12-1	MW12-2
Benzene	1 μg/L	5 μg/L	ND	ND
Toluene	1 μg/L	1000 μg/L	ND	ND
Ethylbenzene	1 μg/L	700 μg/L	ND	ND
Total Xylenes	1 μg/L	10000 μg/L	ND	ND
TPH (Gasoline)[1]	7 μg/L	100 μg/L	81	340
TPH (No. 2 Fuel Oil)[1]	100 μg/L	100 μg/L	ND	ND

* Analyzed by offsite laboratory.
MCL- Maximum Contaminant Level
MDL- Method Detection Limit.
[1]South Dakota standard for wellhead protection areas.
Note: Refer to Figure 5-3 for sample locations.

5.2 SITE 13 - MVMF RESULTS

5.2.1 Screening Activity Results

Results of the screening activities conducted at Site 13 are reported in Appendix A.

5.2.1.1 SOV Survey

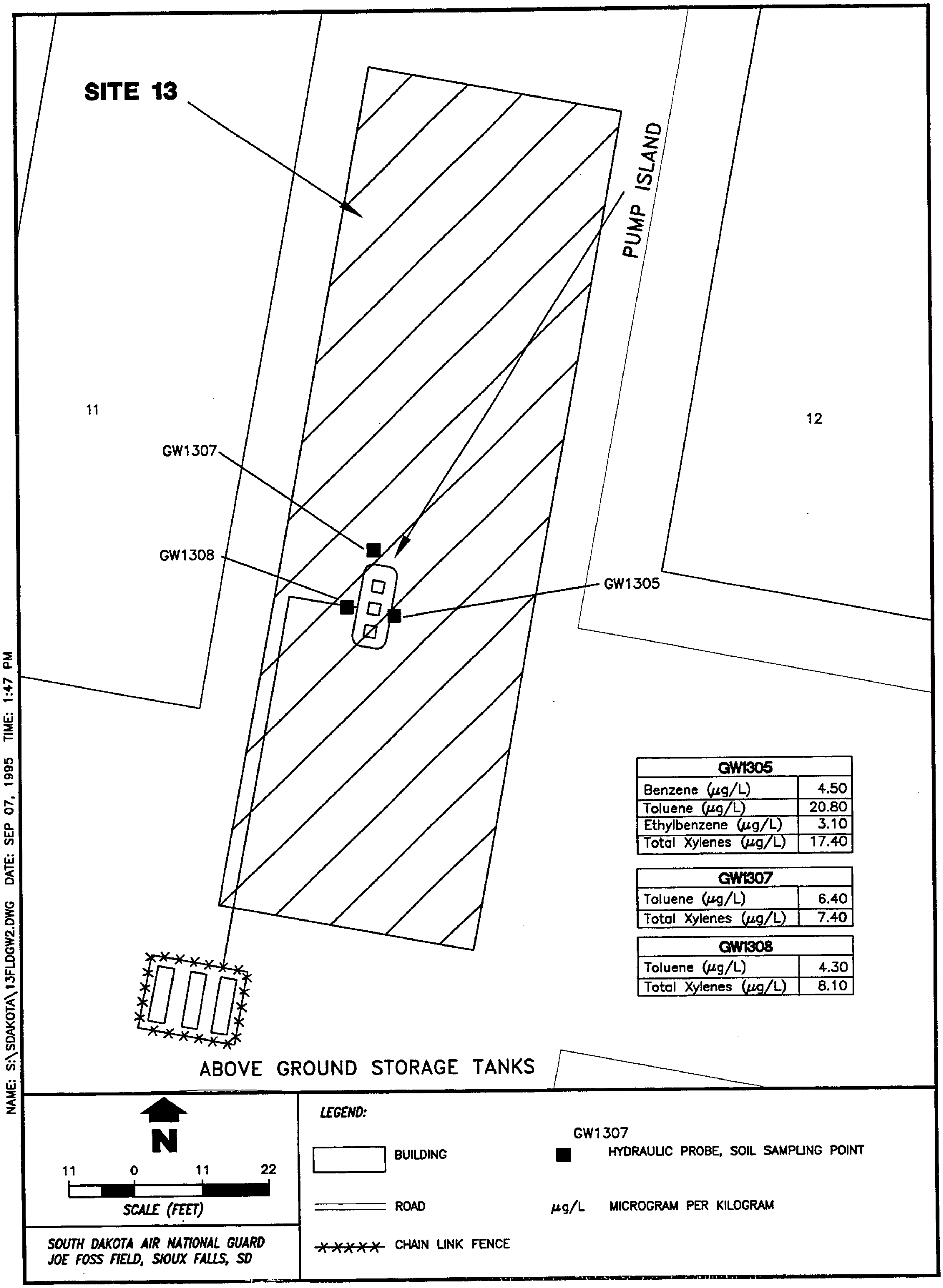
BTEX compounds and TPH (see Appendix A) were not detected in soil gas samples collected at Site 13.

5.2.1.2 Soil Screening

BTEX, TPH, and solvents were not detected in soil samples collected at Site 13.

5.2.1.3 Groundwater Screening

Contaminants at Site 13 were detected immediately surrounding the pump island. BTEX were detected at GW1305, approximately 9 feet due east of the pump island. The maximum concentration of any compound was 20.8 μg/L of toluene. Toluene and xylene also were detected at GW1308, immediately west of the pump island, and GW1307, immediately north of the island, as shown in Figure 5-4 and Table 5-5. VOCs and TPH were not detected in any other groundwater sample.



GW1305	
Benzene (µg/L)	4.50
Toluene (µg/L)	20.80
Ethylbenzene (µg/L)	3.10
Total Xylenes (µg/L)	17.40

GW1307	
Toluene (µg/L)	6.40
Total Xylenes (µg/L)	7.40

GW1308	
Toluene (µg/L)	4.30
Total Xylenes (µg/L)	8.10

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Figure 5-4. Summary of Site 13 Groundwater Field Screening Results

Table 5-5. Site 13 Groundwater Field Screening* Summary of Results

Parameter	Detection Limit	GW1305	GW13O7	GW1308
Benzene	1 μg/L	4.5	ND	ND
Toluene	1 μg/L	20.8	6.4	4.3
Ethylbenzene	1 μg/L	3.1	ND	ND
Total Xylenes	1 μg/L	17.4	7.4	8.1
Solvents	1 μg/L	ND	ND	ND
TPH	500 μg/L	ND	ND	ND

* Analyzed by onsite laboratory .
Note: Refer to Figure 5-4 for sample locations.

5.2.2 Soils

Two soil samples were collected from each of four locations at Site 13 and analyzed for BTEX, TPH, vinyl chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, 1,2-dichloroethene, tetrachloroethene, and carbon tetrachloride. These samples, designated GS13-1, GS13-2, GS13-3, and GS13-4, contained no detectable concentrations of these analytes.

5.2.3 Groundwater

Monitoring well MW13-1 was sampled at Site 13 for BTEX, TPH, and eight solvents. All results for these analytes were below detection limits.

6. CONCLUSIONS

6.1 SITE 12 - RAMP AREA CONCLUSIONS

Subsurface soils immediately east of Area 1 contain detectable concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX) and total petroleum hydrocarbons (TPH) in the soil vapor phase. The highest concentrations of soil vapors are located around soil organic vapor (SOV) point 19 (391.7 μg/L-V TPH and 59.2 μg/L-V xylenes). This point might have been the center of a spill or other release of petroleum products. The soil gas detections seem to be most areally extensive in the 6- to 8-foot sampling interval (approximately 9,000 square feet).

TPH was detected in low concentrations at two of five sampling locations (at 5 and 10 mg/kg [5 and 10 ppm] at GS03 and 5 mg/kg [5 ppm] at GS05) during field screening of soils to confirm the SOV results. No pattern of TPH distribution was apparent among the samples in which TPH was detected. Soil analysis for BTEX and TPH indicated TPH was present above detection limits only at GS05, at 94 μg/kg (0.094 ppm). The location of GS05 coincides with SOV point 19. Petroleum odors were noticeable during sampling.

TPH was detected during groundwater screening at GW12-6 at 70 μg/L (a duplicate sample of GW12-5). BTEX compounds were not detected during the groundwater screening. During confirmatory sampling of the five monitoring wells, TPH was detected at MW12-1, at 81 μg/L and 340 μg/L in two rounds of sampling. The location of GW12-5 coincides with SOV point 19.

These findings indicate that isolated areas of contamination are present in the subsurface soils. This is consistent with the Geotek investigation conducted in 1993. TPH contamination in soils may be impacting groundwater quality at Site 12, especially in the area immediately east of Area 1. However, contaminant levels in soils are below the South Dakota Department of Environment and Natural Resources (DENR) cleanup levels. Maximum contaminant levels (MCLs) for BTEX compounds were not exceeded in groundwater. However, one occurrence of TPH (340 μg/L at MW12-1) exceeds the South Dakota standard of 100 μg/L for wellhead protection areas.

6.2 SITE 13 - MOTOR VEHICLE MAINTENANCE FACILITY CONCLUSIONS

BTEX compounds, TPH, and organic solvents were not detected during the SOV survey and soil screening at Site 13. These analytes were not detected during offsite laboratory analysis of soils at four locations at Site 13.

BTEX compounds were detected at low concentrations in groundwater screening samples obtained from the immediate area of the pump island, at Geoprobe locations GW1305, GW1307, and GW1308. TPH and solvents were not present above detection limits. No analytes above detection limits were detected during offsite laboratory analysis of the groundwater sample from monitoring well GW1-13-01, located downgradient from the Geoprobe points.

7. RECOMMENDATIONS

7.1 SITE 12 - RAMP AREA RECOMMENDATIONS

Isolated areas of low-level contamination have been identified in subsurface soils and groundwater at Site 12. This contamination is present in the area immediately east of Area 1, and at one point in the northwestern corner of the site. Soil organic vapor (SOV) data indicate that a potential source is or was located in soils at or near SOV point 19, immediately east of Area 1. Noticeable odors of petroleum were present during soil and water sampling at Site 12. Soil samples collected at Site 12 contained total petroleum hydrocarbons (TPH) at concentrations below the South Dakota Department of Environment and Natural Resources (DENR) cleanup level of 100 mg/kg.

TPH were detected in one of the five monitoring wells sampled. Concentrations of TPH were below maximum contaminant levels (MCLs) or the South Dakota requirements for wellhead protection areas with one exception (340 μg/L at MW12-1). The groundwater analytical results do not indicate that the TPH is migrating.

The results indicate that contamination is present in the soils and that groundwater quality is locally affected. Therefore, it is recommended that the Air National Guard (ANG) continue groundwater monitoring on a quarterly basis. Groundwater samples were collected from Site 12 in June and July 1995. Three additional rounds of groundwater samples will be collected in February, May, and August 1996. The samples will be analyzed for TPH and benzene, toluene, ethylbenzene, and xylene (BTEX). Continued monitoring will expand the data set for groundwater at Site 12, allowing ANG to determine temporal and spatial variations in TPH concentrations. The data should allow ANG to evaluate whether soil contamination east of Area 1 impacts the groundwater sufficiently to warrant further study.

7.2 SITE 13 - MOTOR VEHICLE MAINTENANCE FACILITY RECOMMENDATIONS

TPH, solvents, and BTEX compounds were not detected during soil gas, soil, and groundwater analyses at Site 13. Although BTEX compounds were present at low concentrations in three groundwater screening locations, none was detected in the sample from the monitoring

well installed at Site 13. BTEX concentrations in groundwater did not exceed MCLs. Because of these findings, Site 13 is recommended for no further action. A decision document recommending no further action should be prepared for Site 13. This recommendation is consistent with the observed low levels of contamination.

8. REFERENCES

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APPENDIX A. TARGET ENVIRONMENTAL SERVICES, INC. SITE SCREENING DATA REPORT

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SITE SCREENING DATA

JOE FOSS FIELD
SIOUX FALLS, SOUTH DAKOTA

PREPARED FOR

SAIC
1710 GOODRIDGE DRIVE
MCLEAN, VIRGINIA 22102

PREPARED BY

TARGET ENVIRONMENTAL SERVICES, INC.
9180 RUMSEY ROAD
COLUMBIA, MARYLAND 21045
(410) 992-6622

JULY 1995

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TABLE OF CONTENTS

FIGURES

TABLES

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Introduction

SAIC contracted **TARGET Environmental Services, Inc. (TARGET)** to perform a site screening survey at **Joe Foss Field**, an active municipal airfield shared by the National Guard and civilian aviators in Sioux Falls, South Dakota. The study area actually includes two sites: the Area 12 Site - Ramp Area and the Area 13 Site - Motor Vehicle Maintenance Facility. Under the direction of SAIC personnel a total of 176 soil gas, 32 soil and 26 groundwater samples were collected at the site. All of the samples except for 5 groundwater samples were analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX) and total petroleum hydrocarbons (TPH). Area 13 Site samples were also analyzed for solvent. The field phase of the survey was performed on June 8-15, 1995.

Sample Collection and Analysis

Soil gas, soil and groundwater samples were collected at multiple depths at the locations shown in Figures 1 through 3. Soil gas samples were collected at 2-foot intervals as deep as 8 feet, soil samples were collected over 2-foot intervals as deep as 9 feet, and groundwater samples were generally collected from 10 to 12 feet.

Prior to the collection of each soil gas sample, the entire sampling system (including down-hole probe, tubing, syringe, and all associated plumbing) was purged with ambient air drawn through an organic vapor filter cartridge. An electric hammer drill was used to penetrate pavement where necessary. To collect the samples, a truck-mounted hydraulic probe was used to advance connected 3-foot sections of 1" to 1.5" OD threaded steel casing down to the sampling depth. Once at depth, the casing was hydraulically raised a fraction of an inch to release a disposable drive point and open the bottom of the casing. A teflon line with a hollow stainless

steel probe end was inserted into the casing to the bottom of the hole, and threaded through a plug which isolates the bottom-hole sampling chamber from the up-hole annulus. A sample of in-situ soil gas was then withdrawn through the probe and used to purge atmospheric air from the sampling system. A second sample of soil gas was withdrawn through the probe and encapsulated in a pre-evacuated glass vial at two atmospheres of pressure (15 psig). The self-sealing vial was detached from the sampling system, packaged, labeled, and stored for laboratory analysis. Deeper samples within the same boring were collected by readvancing the casing with the disposable drive point leading. All sampling holes were backfilled with bentonite and the surface repaired with like material upon completion of the sampling.

Prior to the day's field activities all sampling equipment and probes were decontaminated by washing with a Liquinox/distilled water solution and rinsing thoroughly with distilled water. Internal surfaces were air-dried, and external surfaces were wiped clean using clean paper towels.

To collect the soil samples, a the hydraulic probe was used to advance a 24" long, 1.25" to 1.75" OD steel sampling tube (equipped with an acetate liner and a piston stop tip) attached to connected sections of casing down to the sampling depth. An electric hammer drill was used to penetrate pavement where necessary. The piston stop was then released and the pipe driven an additional 2 feet, allowing soil to enter the sampling tube. The sampling tube was retrieved, and the liner containing the soil core was removed from the casing. The soil was then extruded into glass jars, which were sealed with teflon-lined caps, labeled and relinquished to TEG's on-site mobile laboratory for analysis. The sampling tube was decontaminated by scrubbing with a solution of Liquinox/distilled water, rinsing with distilled water and drying with clean paper towels prior to reuse. A new liner was used for each sample.

To collect the groundwater samples, the hydraulic probe was used to advance steel casing to the sampling depth. An electric hammer drill was used to penetrate pavement where necessary. The steel casing was removed and connected 5-foot sections of 1/2" PVC slotted screen and riser were inserted to the full depth of the hole. A water level sensor was used to detect the surface of the groundwater table and to ensure that a sufficient amount of water had entered the pipe to complete a sample. The water level sensor was removed and the sample was collected using one of two methods. At locations in Area 12, an up-and-down motion was manually applied to a length of teflon tubing fitted at its lower end with a stainless steel ball check valve and inserted down into the casing to the groundwater table, in essence pumping the water using positive displacement. At Area 13 Site, a 21" long by 7/16" O.D. stainless steel bailer was used to collect the sample. Samples were placed in 40 ml glass vials, which were sealed, labeled and relinquished to TEG's on-site mobile laboratory for analysis.

Prior to the day's field activities and after collection of each sample, the steel casing and the bailer or teflon sampling tube were decontaminated by washing with a solution of Liquinox/distilled water, rinsing with distilled water and drying with filtered ambient air to ensure discrete sampling. New sections of PVC slotted screen and riser were used for each groundwater sampling location.

The samples selected for analysis by TEG were analyzed according to the following EPA Methods:

TPH:	8015 modified
BTEX:	8020
Solvent:	3810/8010

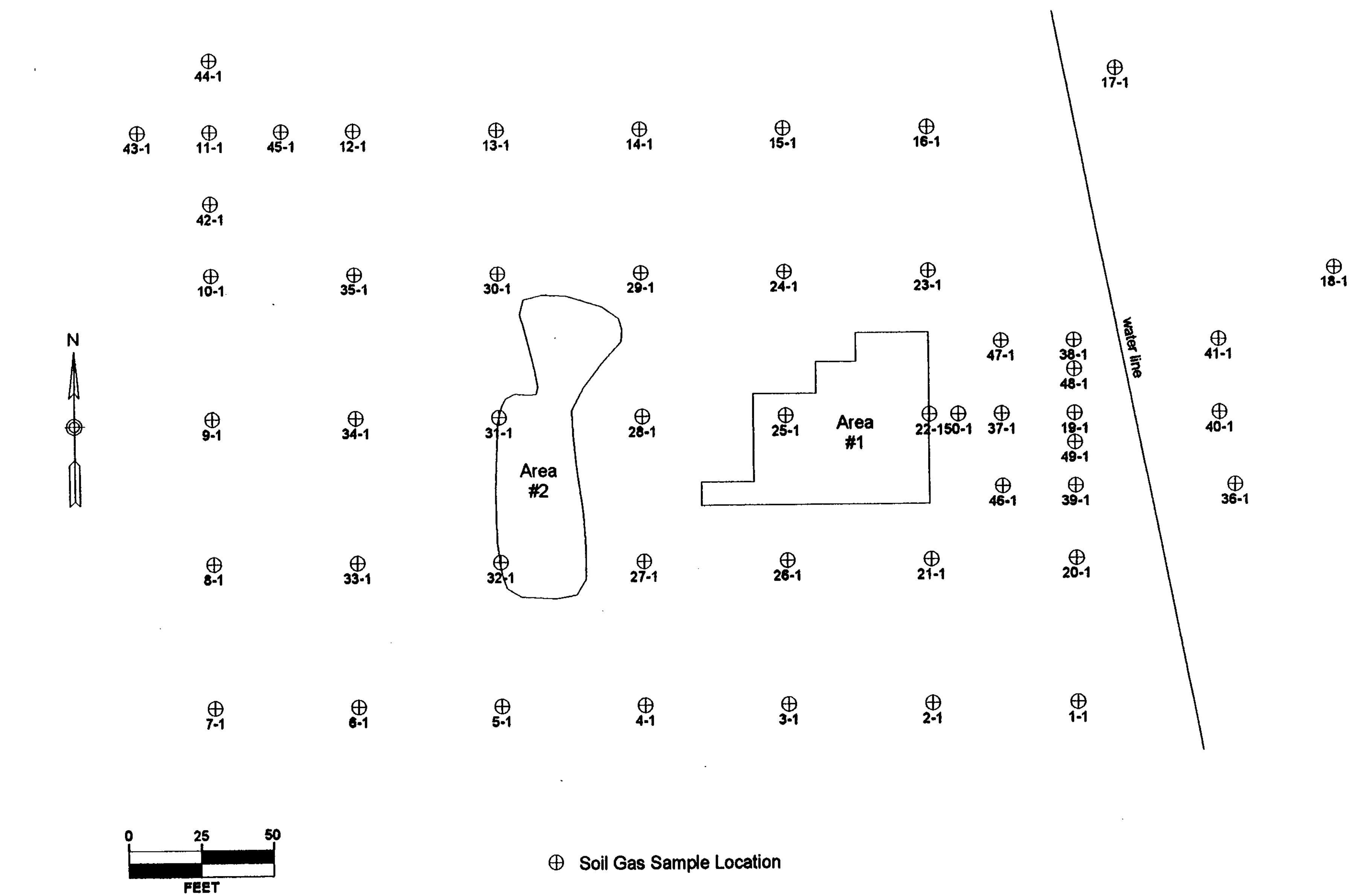
Quality Assurance/Quality Control (QA/QC) Evaluation

Field QA/QC Samples

Soil gas field control samples (blanks) were collected at the beginning and end of each day's field activities, between sites and after every twentieth sample. These QA/QC blanks were obtained by filtering ambient air through a dust and organic vapor filter cartridge and encapsulating as described in the "Field Procedures" in Appendix A. An equipment rinseate blank was collected after groundwater sampling at the Area 13 Site by rinsing distilled water through the decontaminated bailer into sample vials as previously described. The laboratory results for these samples are reported in the attached data tables in their order of collection with the field samples. Concentrations of all analytes were below the detection limit in all field control blanks, indicating that the QA/QC measures employed were sufficient to prevent cross-contamination of the samples during collection. Laboratory QA/QC is presented as received in the attached data tables.

Results

In order to provide graphic presentation of the results, individual data sets from the attached data tables with data above detection limits have been mapped and contoured to produce Figures 4 through 19. Map sample points with no data shown indicate that the analyte concentrations in the sample were below the detection limit. Area 12 soil samples were too far apart and too irregularly spaced to facilitate contouring, although the data was mapped. Area 13 soil samples yielded no detectable concentrations of BTEX or TPH and were therefore not mapped.

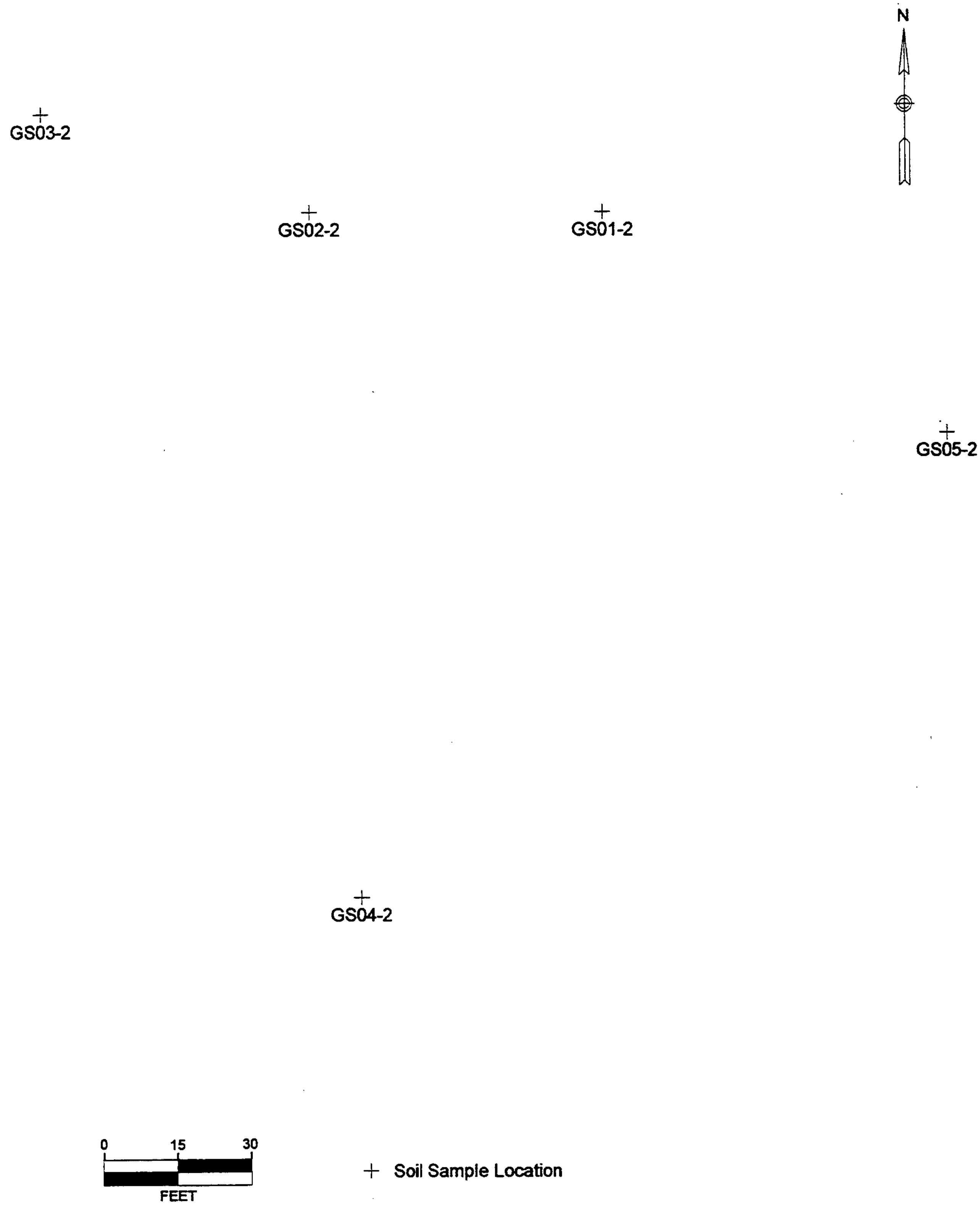


TARGET ENVIRONMENTAL SERVICES, INC.

This map is integral to a written report and should be viewed in that context.

FIGURE 1. Soil Gas Sample Locations

AREA 12 SITE
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA



TARGET ENVIRONMENTAL SERVICES, INC.

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FIGURE 2. Soil Sample Locations

AREA 12 SITE
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

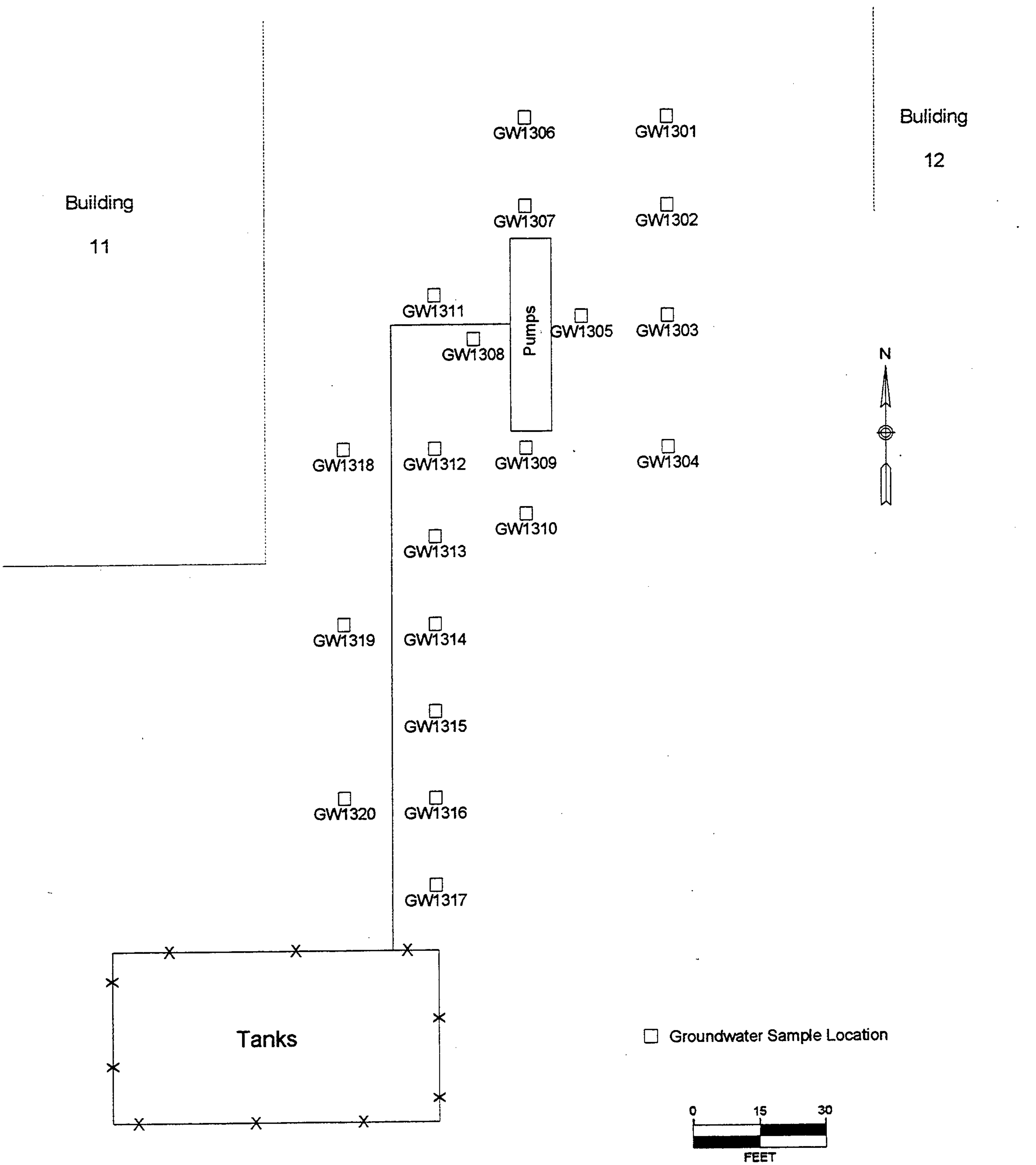

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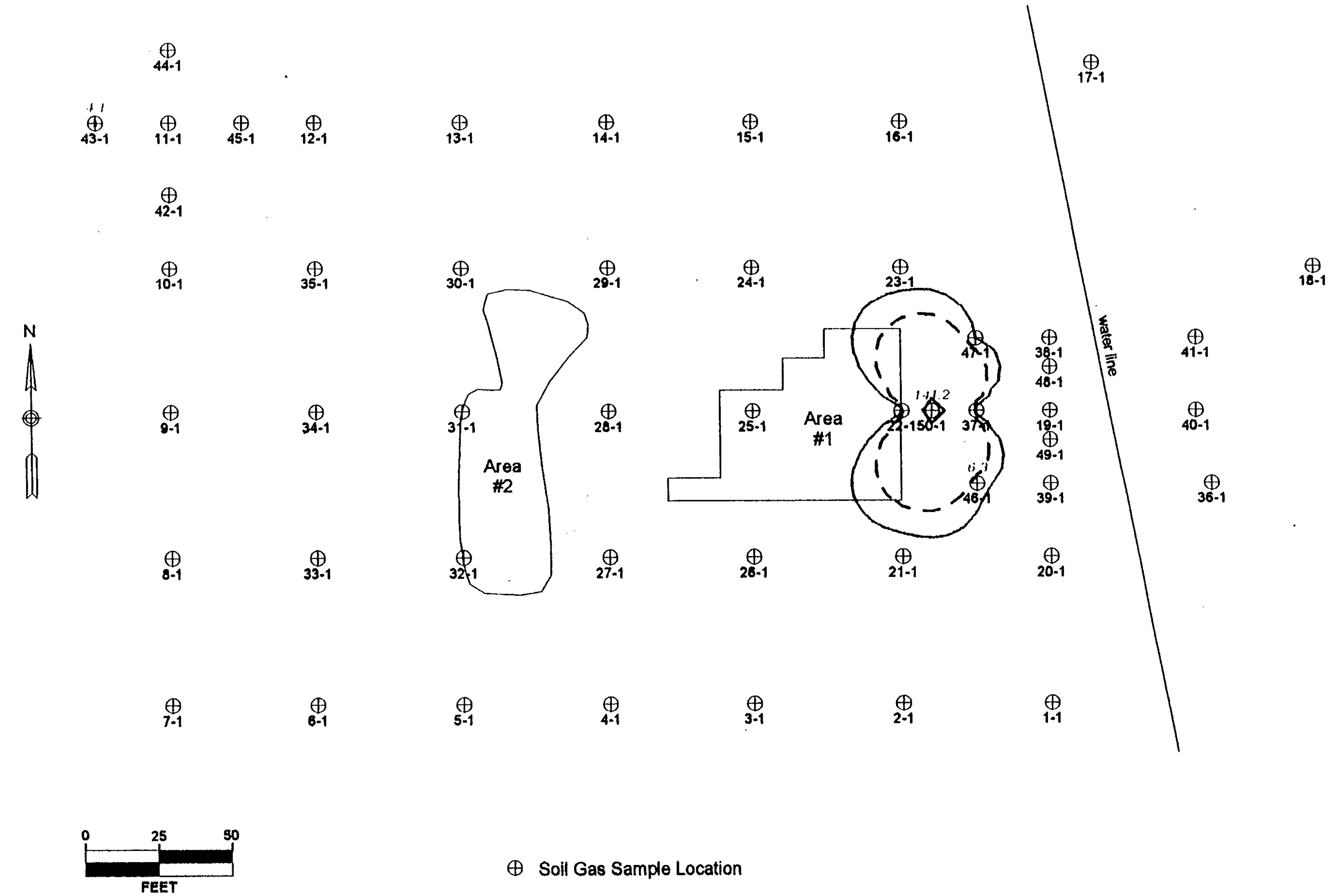
FIGURE 3. Groundwater Sample Locations

AREA 13 SITE
SOUTH DAKOTA AIR NATIONAL GUARD BASE
SIOUX FALLS, SOUTH DAKOTA



CONCENTRATION CONTOUR KEY

4 ———

10 — — —

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FIGURE 4. TPH (ug/l-v)

AREA 12 SOIL GAS, 2'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

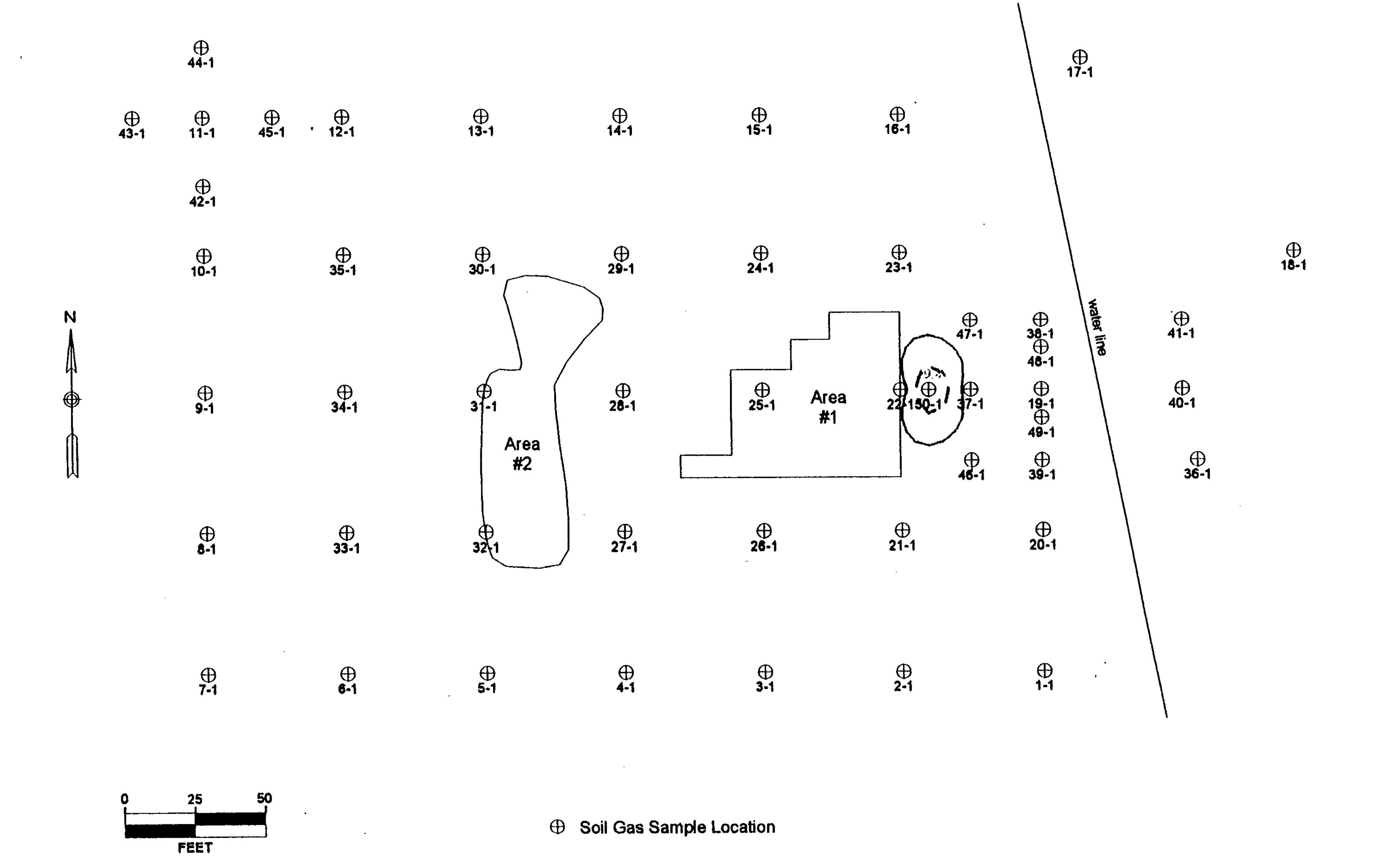

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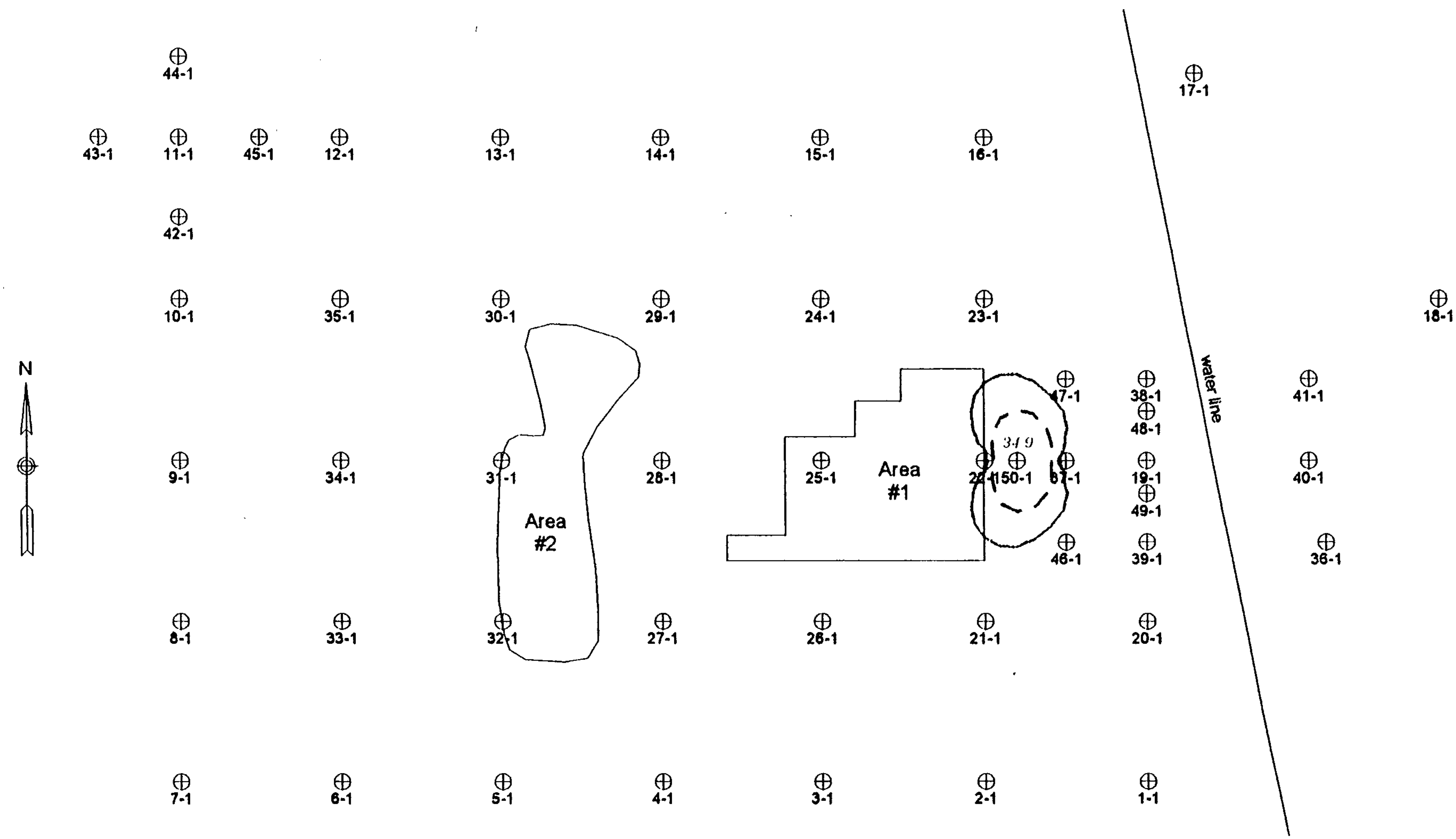
FIGURE 5. Ethylbenzene (ug/l-v)

AREA 12 SOIL GAS, 2'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA



0 25 50
FEET

⊕ Soil Gas Sample Location

CONCENTRATION CONTOUR KEY

4
10

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FIGURE 6. Xylenes (ug/l-v)

AREA 12 SOIL GAS, 2'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

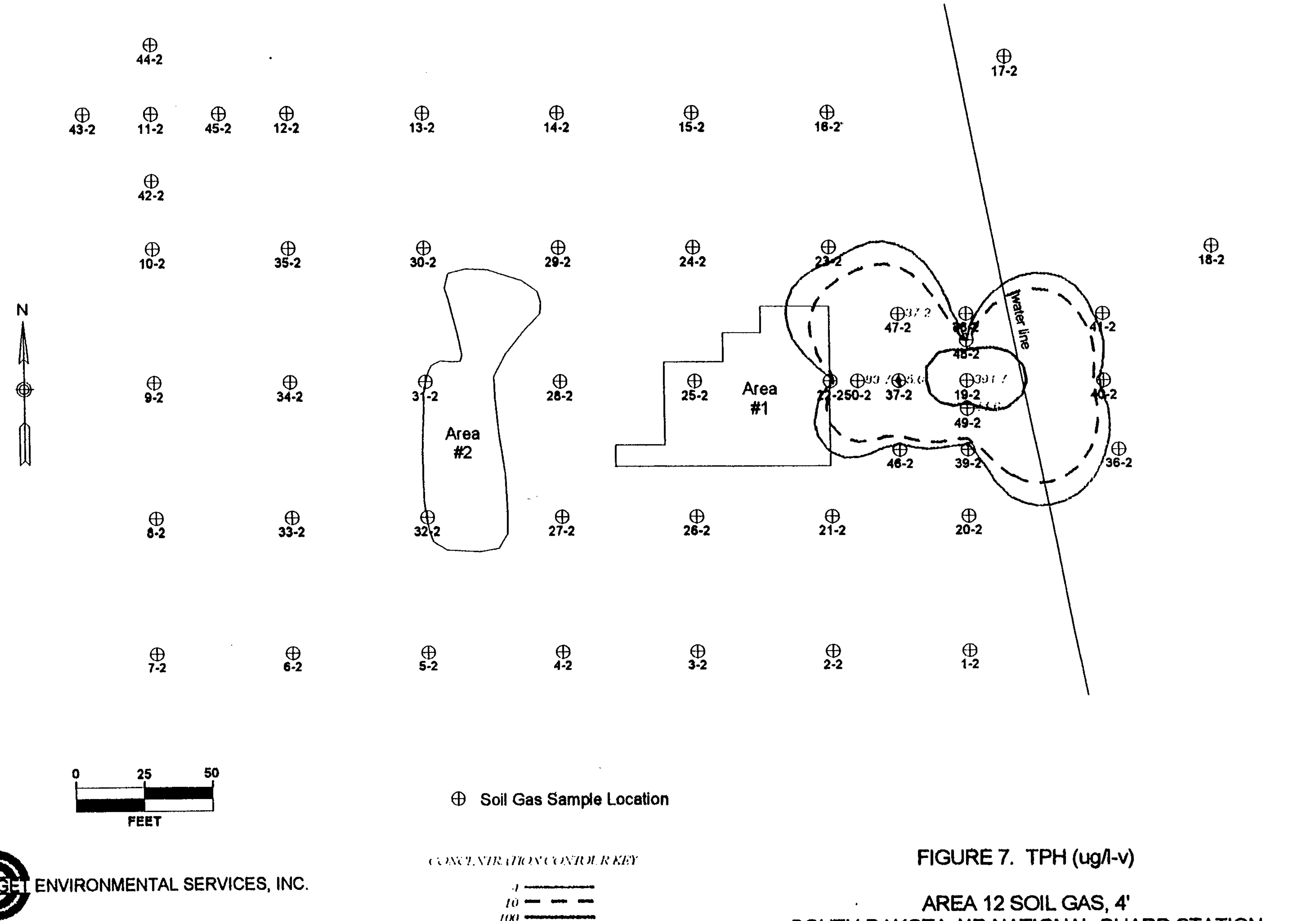

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FIGURE 7. TPH (ug/l-v)

AREA 12 SOIL GAS, 4'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

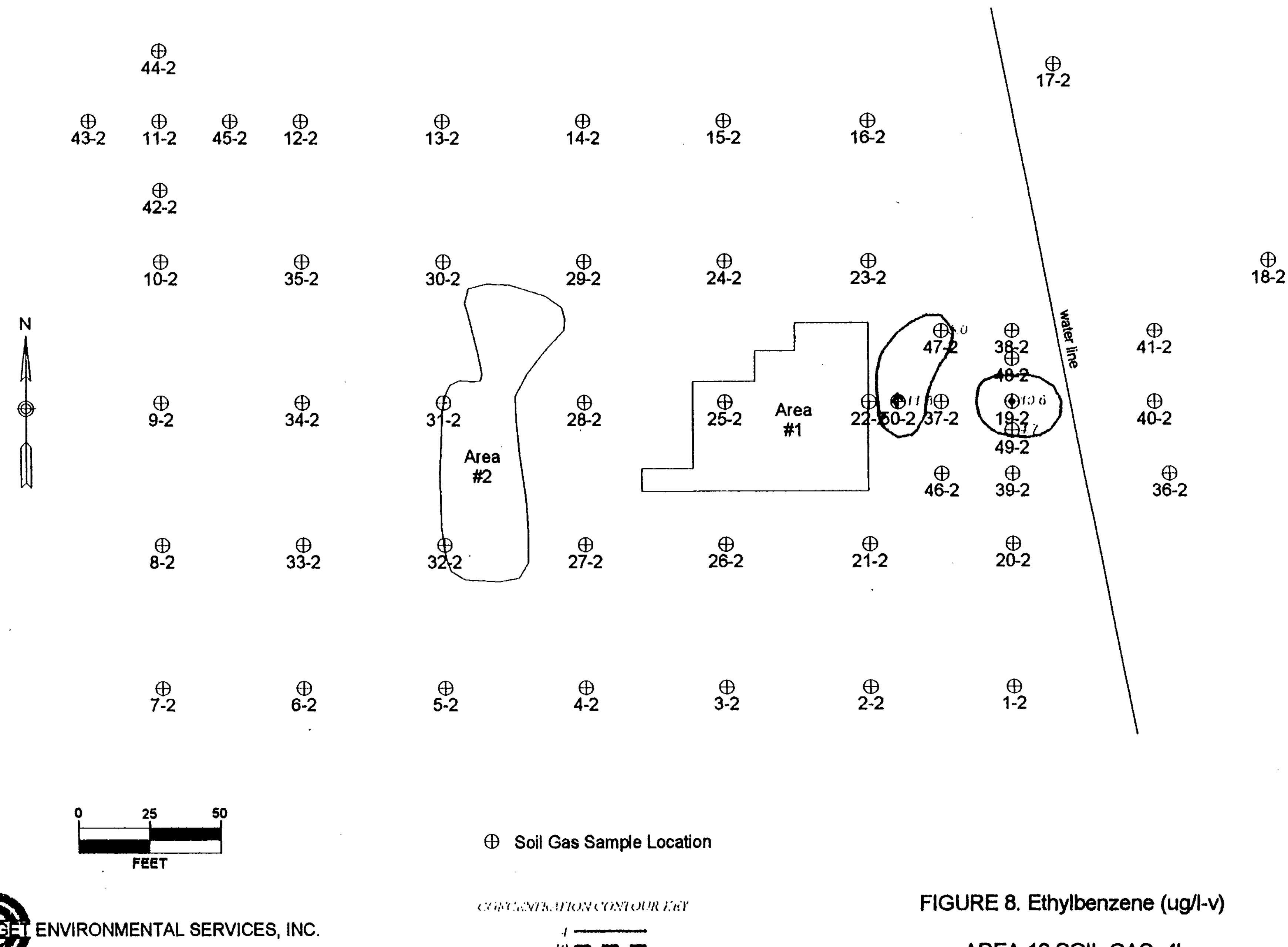

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FIGURE 8. Ethylbenzene (ug/l-v)

AREA 12 SOIL GAS, 4'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

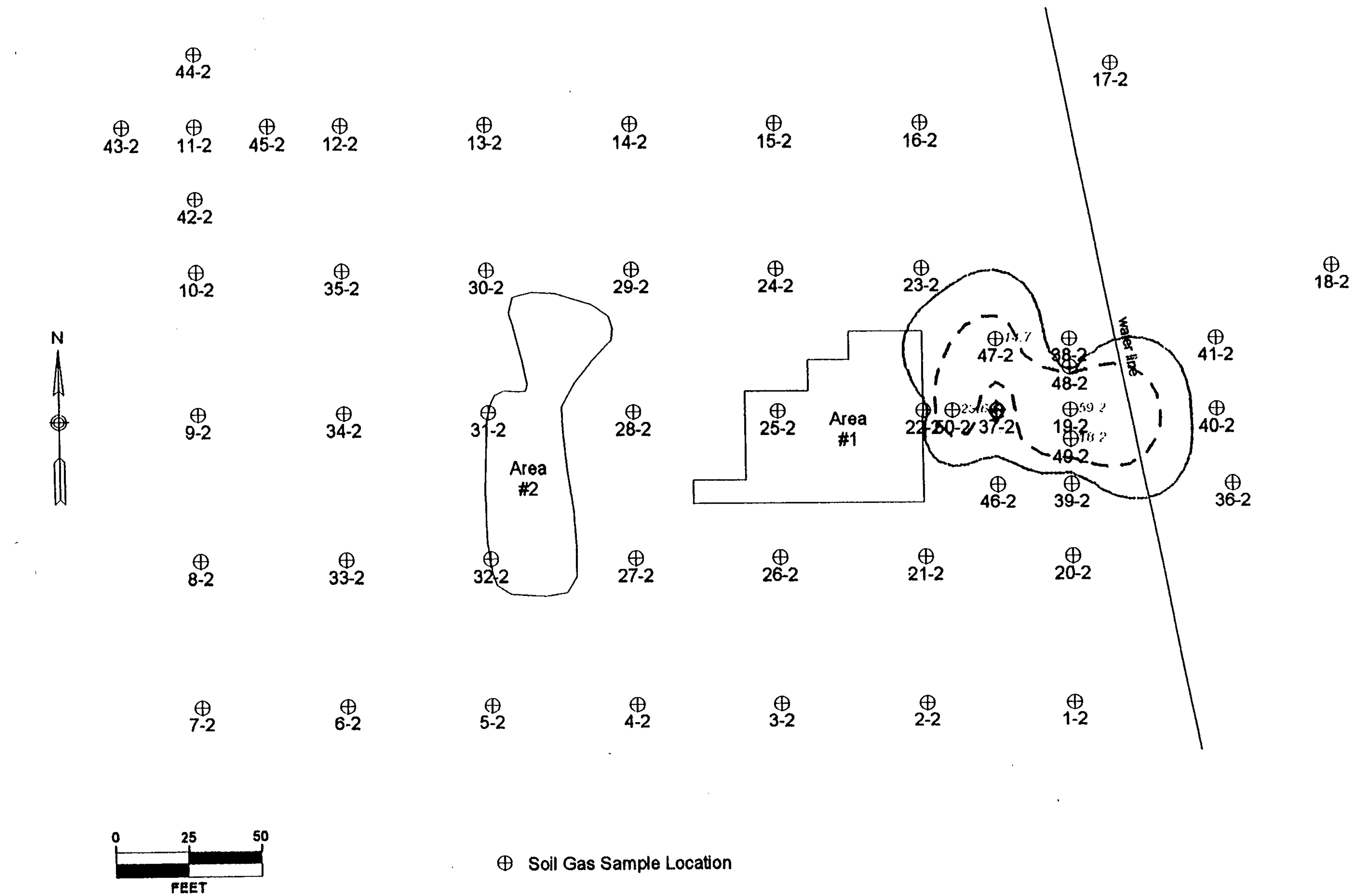

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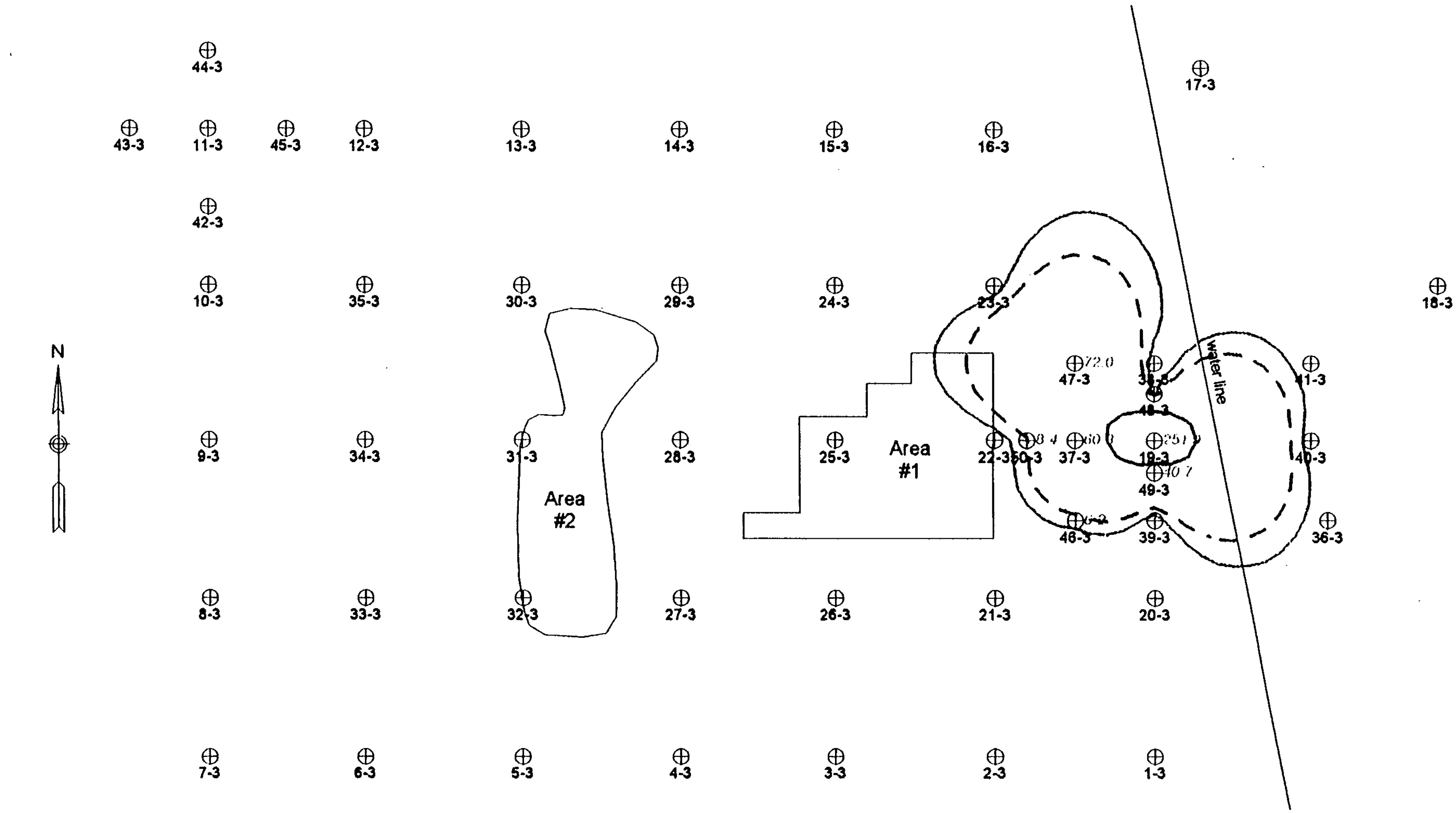
FIGURE 9. Xylenes (ug/l-v)

AREA 12 SOIL GAS, 4'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA



0 25 50

FEET

⊕ Soil Gas Sample Location

CONCENTRATION CONTOUR KEY

4

10

100

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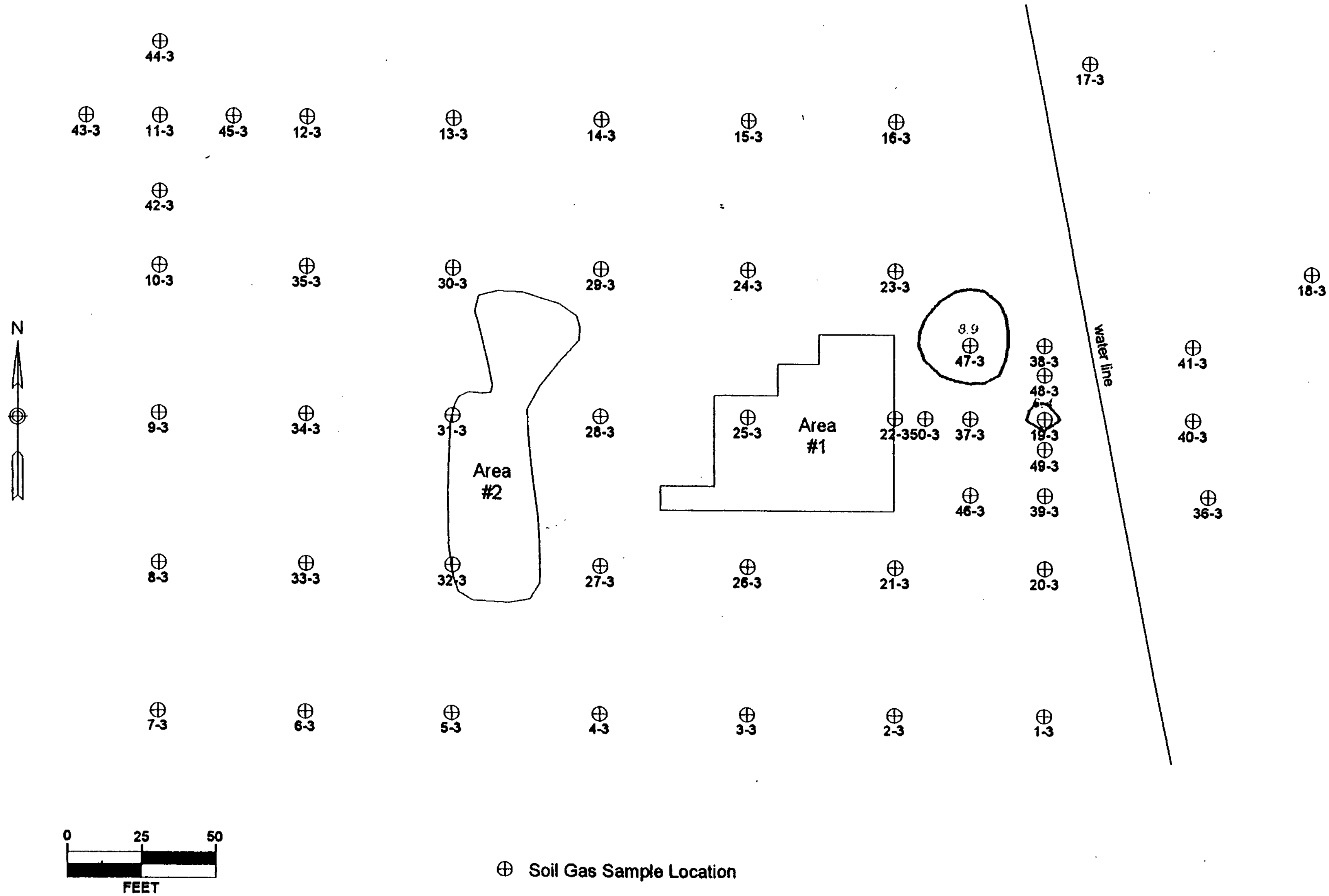
FIGURE 10. TPH (ug/l-v)

AREA 12 SITE SOIL GAS, 6'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA



⊕ Soil Gas Sample Location

CONCENTRATION CONTOUR KEY

4

10

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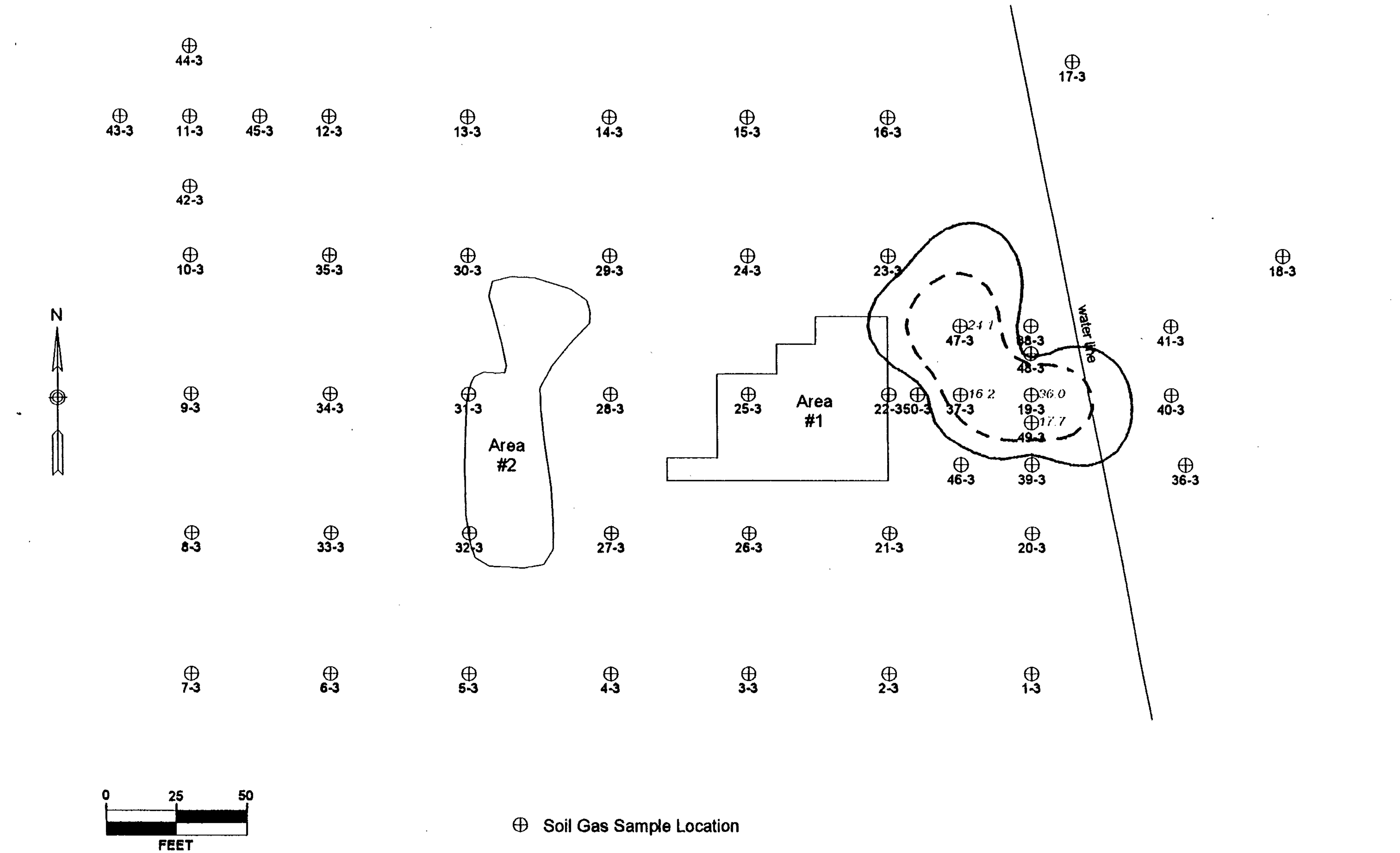
FIGURE 11. Ethylbenzene (ug/l-v)

AREA 12 SITE SOIL GAS, 6'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA



CONCENTRATION CONTOUR KEY

4 ————

10 — — —

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FIGURE 12. Xylenes (ug/l-v)

AREA 12 SITE SOIL GAS, 6'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

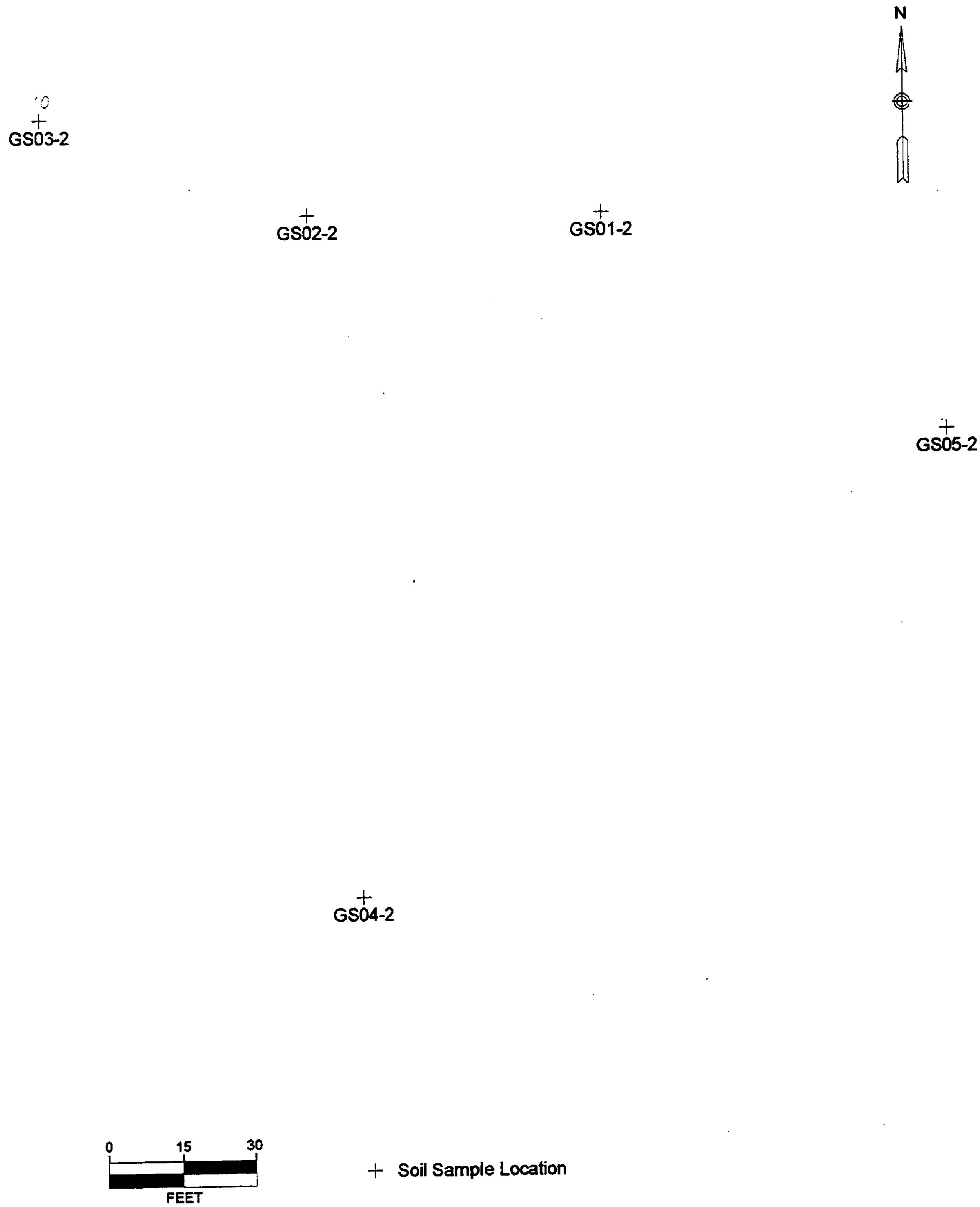

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FIGURE 13. TPH - Diesel (mg/kg)

AREA 12 SITE SOIL, 2'-4'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

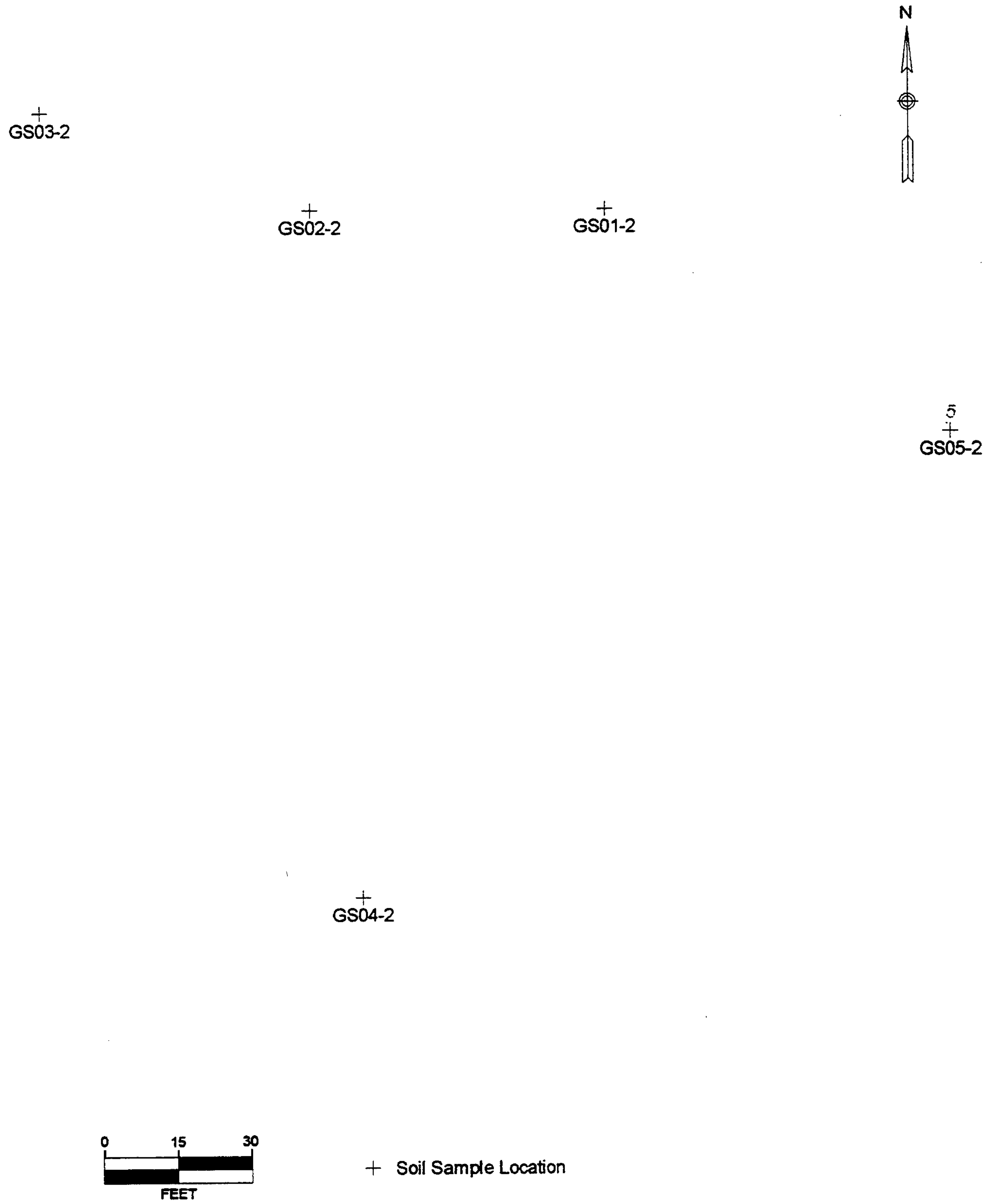

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FIGURE 14. TPH - Diesel (mg/kg)

AREA 12 SITE SOIL, 4'-6'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

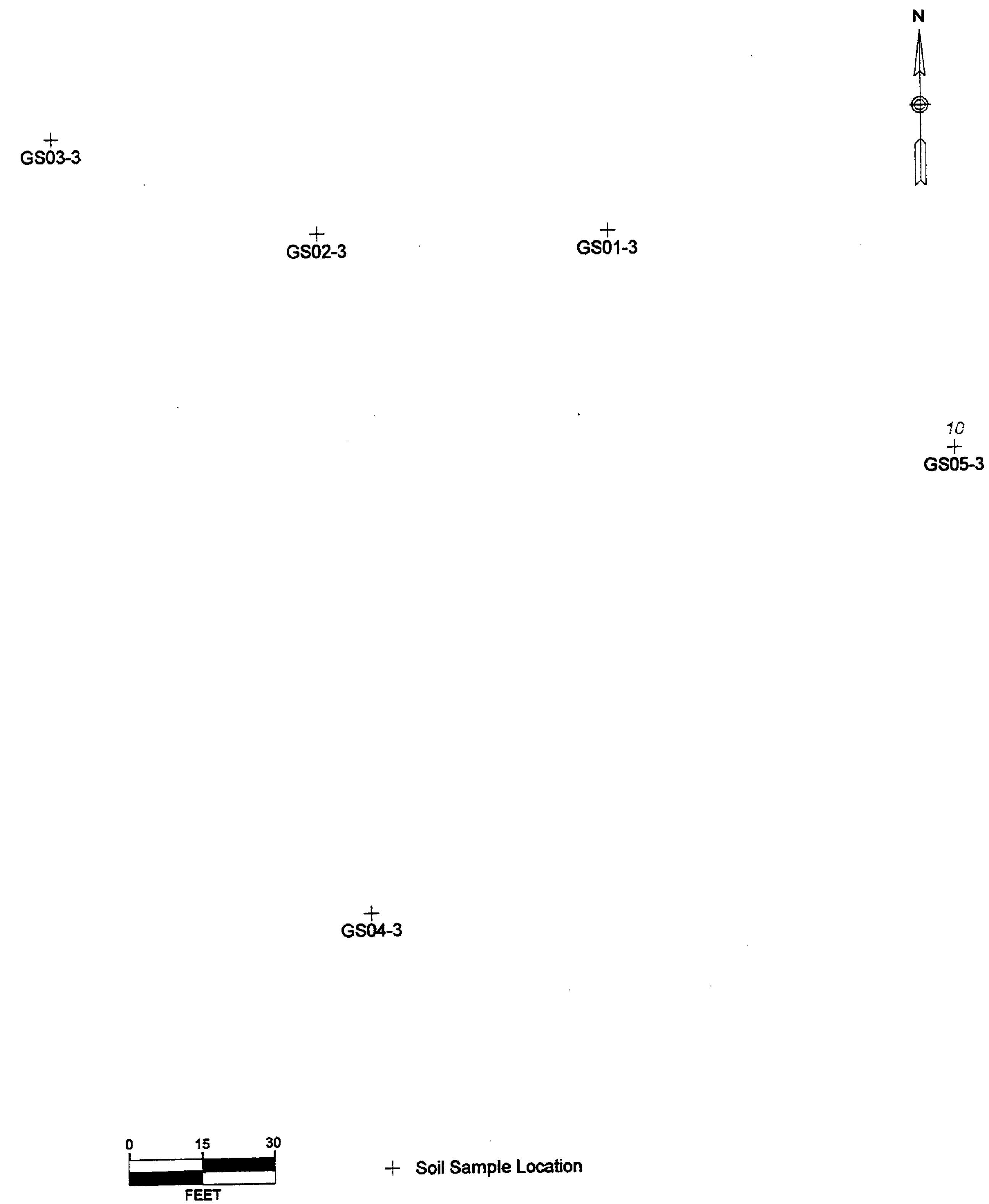

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FIGURE 15. TPH - Diesel (mg/kg)

AREA 12 SITE SOIL, 6'-8'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

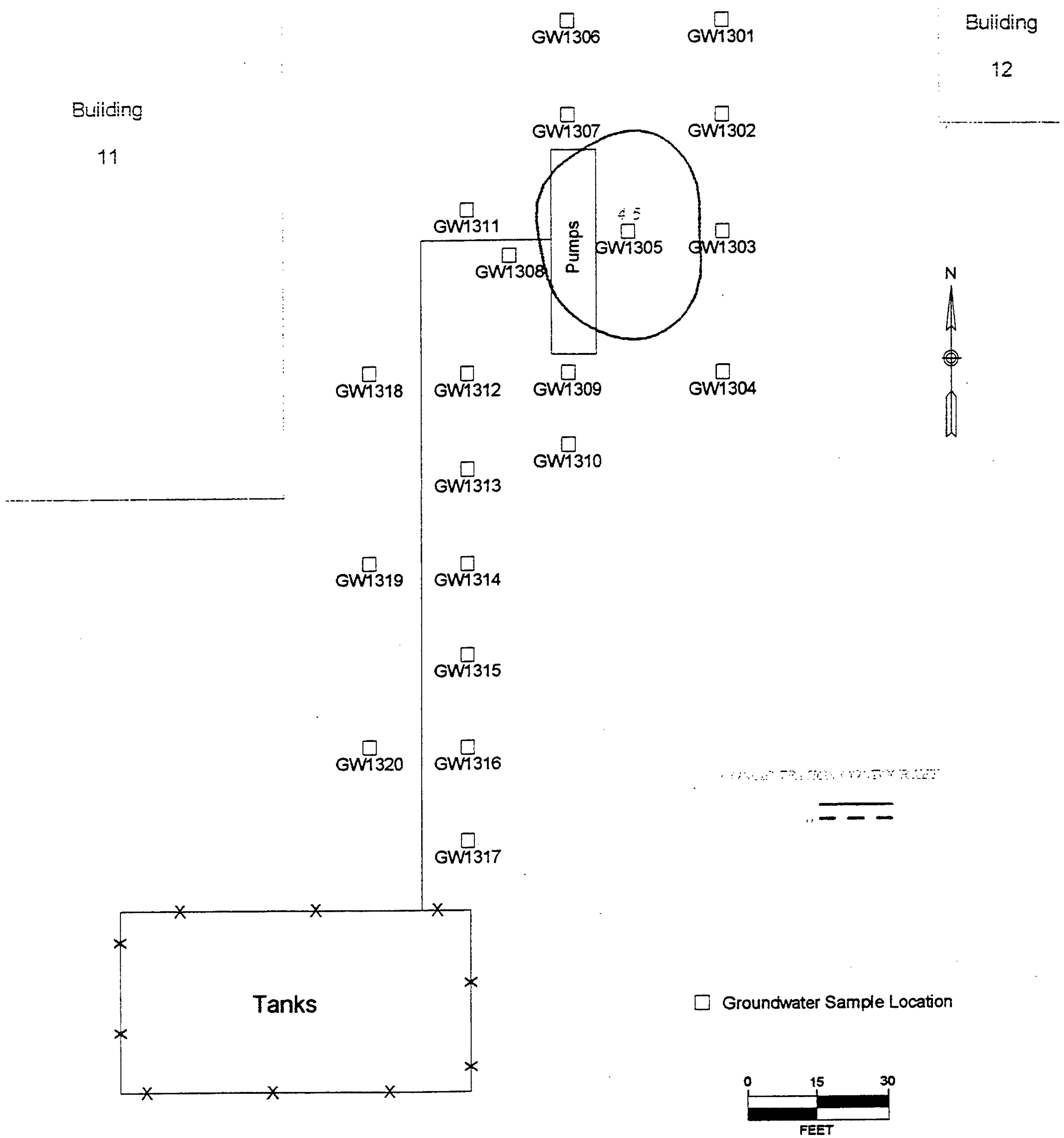

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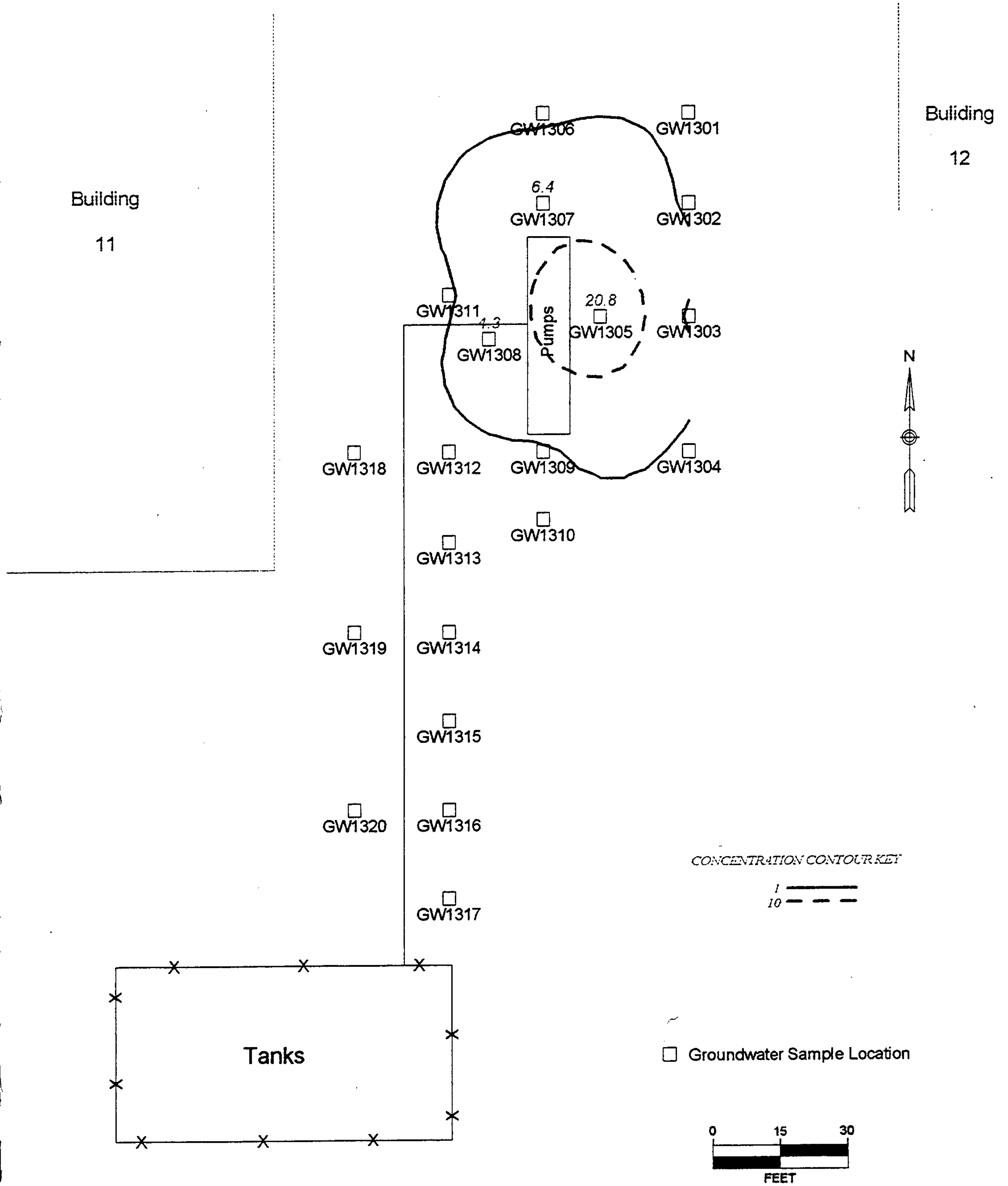
FIGURE 16. Benzene (ug/l)

AREA 13 SITE GROUNDWATER
SOUTH DAKOTA AIR NATIONAL GUARD BASE
SIOUX FALLS, SOUTH DAKOTA



TARGET ENVIRONMENTAL SERVICES, INC.

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FIGURE 17. Toluene (ug/l)

AREA 13 SITE GROUNDWATER
SOUTH DAKOTA AIR NATIONAL GUARD BASE
SIOUX FALLS, SOUTH DAKOTA

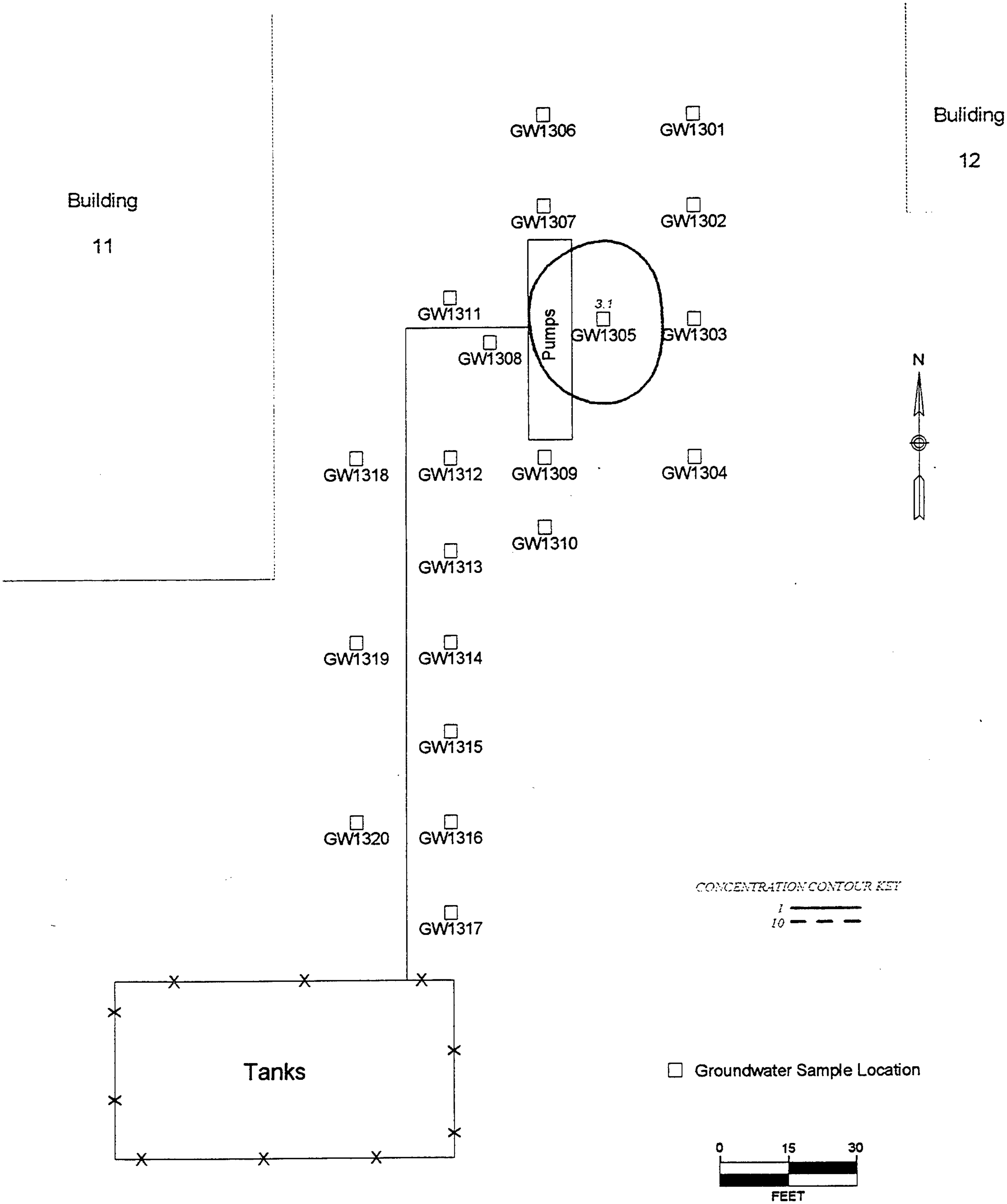

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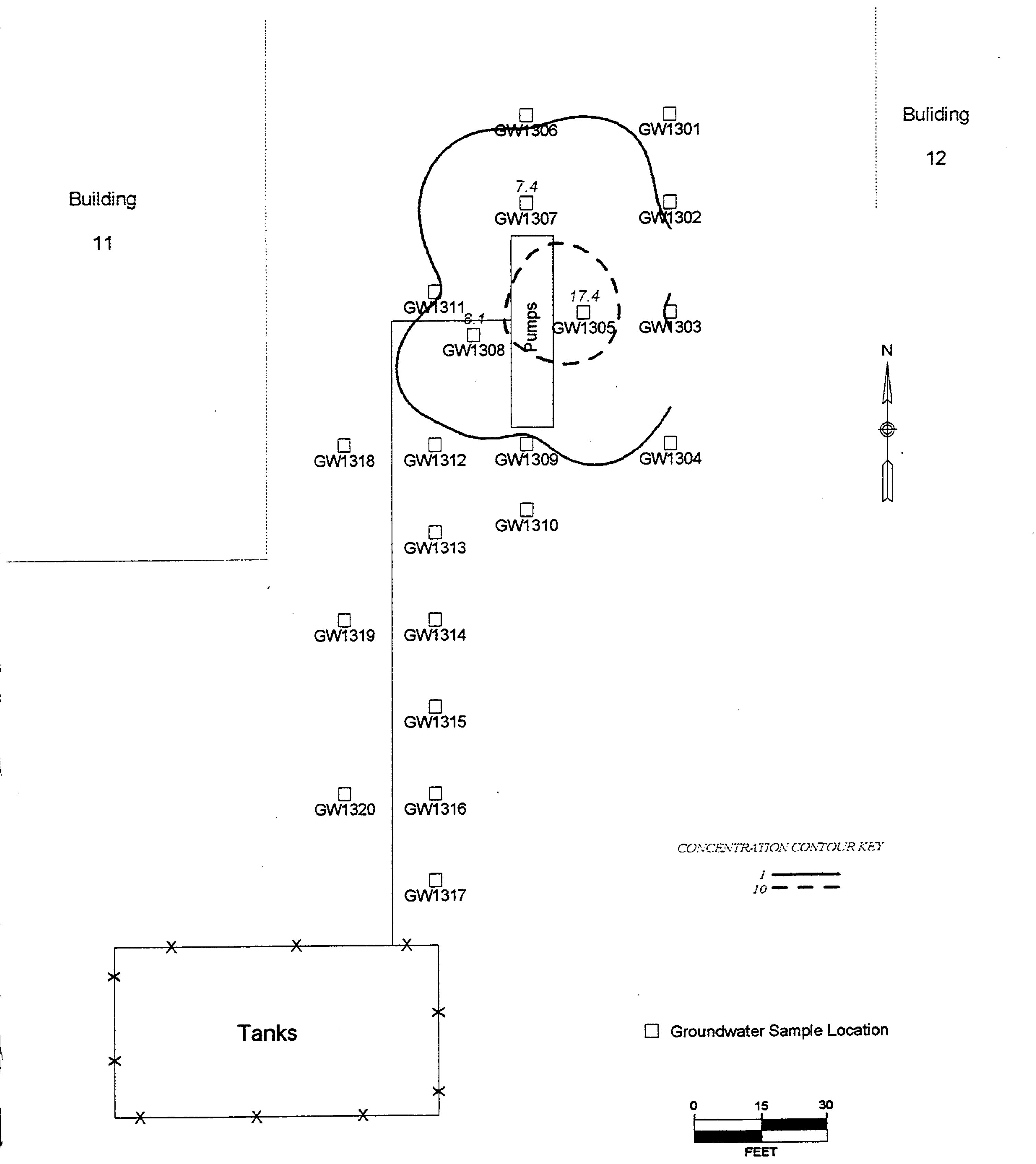
FIGURE 18. Ethylbenzene (ug/l)

AREA 13 SITE GROUNDWATER
SOUTH DAKOTA AIR NATIONAL GUARD BASE
SIOUX FALLS, SOUTH DAKOTA



TARGET ENVIRONMENTAL SERVICES, INC.

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FIGURE 19. Xylenes (ug/l)

AREA 13 SITE GROUNDWATER
SOUTH DAKOTA AIR NATIONAL GUARD BASE
SIOUX FALLS, SOUTH DAKOTA

Soil Gas

FINAL DATA

SAIC Project # 01-0827-04-3423-008 @

South Dakota Air National Guard Station

Sioux Falls, SD

UNITS = microgram per liter of air (ug/L of Air)   DETECTION LIMIT = 4.00 ug/L of Air

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	TOTAL XYLENES	SOLVENT
500 BLK	6/8/95	ND	ND	ND	ND	ND	ND
SG1-1	6/8/95	ND	ND	ND	ND	ND	ND
SG1-1 DUP	6/8/95	ND	ND	ND	ND	ND	ND
SG1-2	6/8/95	ND	ND	ND	ND	ND	ND
SG1-3	6/8/95	ND	ND	ND	ND	ND	ND
SG1-4	6/8/95	ND	ND	ND	ND	ND	ND
SG2-1	6/8/95	ND	ND	ND	ND	ND	ND
SG2-2	6/8/95	ND	ND	ND	ND	ND	ND
SG2-3	6/8/95	ND	ND	ND	ND	ND	ND
SG2-4	6/8/95	ND	ND	ND	ND	ND	ND
SG3-1	6/8/95	ND	ND	ND	ND	ND	ND
SG3-2	6/8/95	ND	ND	ND	ND	ND	ND
SG3-3	6/8/95	ND	ND	ND	ND	ND	ND
SG3-3D	6/8/95	ND	ND	ND	ND	ND	ND
SG3-4	6/8/95	ND	ND	ND	ND	ND	ND
SG4-1	6/8/95	ND	ND	ND	ND	ND	ND
SG4-2	6/8/95	ND	ND	ND	ND	ND	ND
SG4-3	6/8/95	ND	ND	ND	ND	ND	ND
SG4-4	6/8/95	ND	ND	ND	ND	ND	ND
SG5-1	6/8/95	ND	ND	ND	ND	ND	ND
SG5-2	6/8/95	ND	ND	ND	ND	ND	ND
SG5-3	6/8/95	ND	ND	ND	ND	ND	ND
SG5-4	6/8/95	ND	ND	ND	ND	ND	ND
501 BLK	6/9/95	ND	ND	ND	ND	ND	ND
502 BLK	6/9/95	ND	ND	ND	ND	ND	
SG12 1-1	6/9/95	ND	ND	ND	ND	ND	
SG12 1-2	6/9/95	ND	ND	ND	ND	ND	
SG12 1-3	6/9/95	ND	ND	ND	ND	ND	
SG12 1-4	6/9/95	ND	ND	ND	ND	ND	
SG12 2-1	6/9/95	ND	ND	ND	ND	ND	
SG12 2-2	6/9/95	ND	ND	ND	ND	ND	
SG12 2-3	6/9/95	ND	ND	ND	ND	ND	
SG12 2-4	6/9/95	ND	ND	ND	ND	ND	
SG12 3-1	6/9/95	ND	ND	ND	ND	ND	
SG12 3-2	6/9/95	ND	ND	ND	ND	ND	
SG12 3-3	6/9/95	ND	ND	ND	ND	ND	
SG12 4-1	6/9/95	ND	ND	ND	ND	ND	
SG12 4-2	6/9/95	ND	ND	ND	ND	ND	
SG12 4-3	6/9/95	ND	ND	ND	ND	ND	
SG12 5-1	6/9/95	ND	ND	ND	ND	ND	
SG12 5-2	6/9/95	ND	ND	ND	ND	ND	
SG12 5-3	6/9/95	ND	ND	ND	ND	ND	
SG12 6-1	6/9/95	ND	ND	ND	ND	ND	
SG12 6-2	6/9/95	ND	ND	ND	ND	ND	
SG12 6-3	6/9/95	ND	ND	ND	ND	ND	
SG12 7-1	6/9/95	ND	ND	ND	ND	ND	
SG12 7-2	6/9/95	ND	ND	ND	ND	ND	
SG12 7-3	6/9/95	ND	ND	ND	ND	ND	
SG12 11-1	6/9/95	ND	ND	ND	ND	ND	
SG12 11-1 DUP	6/9/95	ND	ND	ND	ND	ND	
SG12 11-2	6/9/95	ND	ND	ND	ND	ND	
SG12 11-3	6/9/95	ND	ND	ND	ND	ND	
503 BLK	6/9/95	ND	ND	ND	ND	ND	
504 BLK	6/9/95	ND	ND	ND	ND	ND	

Soil Gas
FINAL DATA
SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

UNITS = microgram per liter of air (ug/L of Air)   DETECTION LIMIT = 4.00 ug/L of Air

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	TOTAL XYLENES
505 BLK	6/10/95	ND	ND	ND	ND	ND
SG12 10-1	6/10/95	ND	ND	ND	ND	ND
SG12 10-2	6/10/95	ND	ND	ND	ND	ND
SG12 10-3	6/10/95	ND	ND	ND	ND	ND
SG12 9-1	6/10/95	ND	ND	ND	ND	ND
SG12 9-2	6/10/95	ND	ND	ND	ND	ND
SG12 9-3	6/10/95	ND	ND	ND	ND	ND
SG12 8-1	6/10/95	ND	ND	ND	ND	ND
SG12 8-2	6/10/95	ND	ND	ND	ND	ND
SG12 8-3	6/10/95	ND	ND	ND	ND	ND
SG12 12-1	6/10/95	ND	ND	ND	ND	ND
SG12 12-2	6/10/95	ND	ND	ND	ND	ND
SG12 12-3	6/10/95	ND	ND	ND	ND	ND
SG12 13-1	6/10/95	ND	ND	ND	ND	ND
SG12 13-2	6/10/95	ND	ND	ND	ND	ND
SG12 13-3	6/10/95	ND	ND	ND	ND	ND
SG12 14-1	6/10/95	ND	ND	ND	ND	ND
SG12 14-2	6/10/95	ND	ND	ND	ND	ND
SG12 14-3	6/10/95	ND	ND	ND	ND	ND
SG12 15-1	6/10/95	ND	ND	ND	ND	ND
SG12 15-2	6/10/95	ND	ND	ND	ND	ND
506 BLK	6/10/95	ND	ND	ND	ND	ND
SG12 15-3	6/10/95	ND	ND	ND	ND	ND
SG12 16-1	6/10/95	ND	ND	ND	ND	ND
SG12 16-2	6/10/95	ND	ND	ND	ND	ND
SG12 16-3	6/10/95	ND	ND	ND	ND	ND
SG12 17-1	6/10/95	ND	ND	ND	ND	ND
SG12 17-2	6/10/95	ND	ND	ND	ND	ND
SG12 17-3	6/10/95	ND	ND	ND	ND	ND
SG12 18-1	6/10/95	ND	ND	ND	ND	ND
SG12 18-2	6/10/95	ND	ND	ND	ND	ND
SG12 18-3	6/10/95	ND	ND	ND	ND	ND
SG12 18-3DUP	6/10/95	ND	ND	ND	ND	ND
SG12 19-1	6/10/95	ND	ND	ND	ND	ND
SG12 19-2	6/10/95	391.73	ND	ND	10.56	59.20
SG12 19-2DUP	6/10/95	355.25	ND	ND	7.11	55.94
SG12 19-3	6/10/95	251.93	ND	ND	6.36	36.00
SG12 19-3DUP	6/10/95	173.73	ND	ND	5.57	24.74
SG12 20-1	6/10/95	ND	ND	ND	ND	ND
SG12 20-2	6/10/95	ND	ND	ND	ND	ND
SG12 20-3	6/10/95	ND	ND	ND	ND	ND
SG12 21-1	6/10/95	ND	ND	ND	ND	ND
SG12 21-2	6/10/95	ND	ND	ND	ND	ND
SG12 21-3	6/10/95	ND	ND	ND	ND	ND
SG12 22-1	6/10/95	ND	ND	ND	ND	ND
507 BLK	6/10/95	ND	ND	ND	ND	ND
SG12 22-2	6/10/95	ND	ND	ND	ND	ND
SG12 22-3	6/10/95	ND	ND	ND	ND	ND
SG12 23-1	6/10/95	ND	ND	ND	ND	ND
SG12 23-2	6/10/95	ND	ND	ND	ND	ND
SG12 23-3	6/10/95	ND	ND	ND	ND	ND
SG12 24-1	6/10/95	ND	ND	ND	ND	ND
SG12 24-2	6/10/95	ND	ND	ND	ND	ND
SG12 24-3	6/10/95	ND	ND	ND	ND	ND
SG12 25-1	6/10/95	ND	ND	ND	ND	ND
SG12 25-2	6/10/95	ND	ND	ND	ND	ND
SG12 25-3	6/10/95	ND	ND	ND	ND	ND
508 BLK	6/10/95	ND	ND	ND	ND	ND

Soil Gas
FINAL DATA
SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

UNITS = microgram per liter of air (ug/L of Air) DETECTION LIMIT = 4.00 ug/L of Air

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	TOTAL XYLENES
509 BLK	6/11/95	ND	ND	ND	ND	ND
SG12 26-1	6/11/95	ND	ND	ND	ND	ND
SG12 26-2	6/11/95	ND	ND	ND	ND	ND
SG12 26-3	6/11/95	ND	ND	ND	ND	ND
SG12 27-1	6/11/95	ND	ND	ND	ND	ND
SG12 27-2	6/11/95	ND	ND	ND	ND	ND
SG12 27-3	6/11/95	ND	ND	ND	ND	ND
SG12 28-1	6/11/95	ND	ND	ND	ND	ND
SG12 28-2	6/11/95	ND	ND	ND	ND	ND
SG12 28-3	6/11/95	ND	ND	ND	ND	ND
SG12 29-1	6/11/95	ND	ND	ND	ND	ND
SG12 29-2	6/11/95	ND	ND	ND	ND	ND
SG12 29-3	6/11/95	ND	ND	ND	ND	ND
SG12 30-1	6/11/95	ND	ND	ND	ND	ND
SG12 30-2	6/11/95	ND	ND	ND	ND	ND
SG12 30-3	6/11/95	ND	ND	ND	ND	ND
SG12 31-1	6/11/95	ND	ND	ND	ND	ND
SG12 31-2	6/11/95	ND	ND	ND	ND	ND
SG12 31-3	6/11/95	ND	ND	ND	ND	ND
SG12 32-1	6/11/95	ND	ND	ND	ND	ND
SG12 32-2	6/11/95	ND	ND	ND	ND	ND
SG12 32-3	6/11/95	ND	ND	ND	ND	ND
510 BLK	6/11/95	ND	ND	ND	ND	ND
SG12 33-1	6/11/95	ND	ND	ND	ND	ND
SG12 33-2	6/11/95	ND	ND	ND	ND	ND
SG12 33-3	6/11/95	ND	ND	ND	ND	ND
SG12 34-1	6/11/95	ND	ND	ND	ND	ND
SG12 34-2	6/11/95	ND	ND	ND	ND	ND
SG12 34-3	6/11/95	ND	ND	ND	ND	ND
SG12 35-1	6/11/95	ND	ND	ND	ND	ND
SG12 35-2	6/11/95	ND	ND	ND	ND	ND
SG12 35-3	6/11/95	ND	ND	ND	ND	ND
SG12 36-1	6/11/95	ND	ND	ND	ND	ND
SG12 36-2	6/11/95	ND	ND	ND	ND	ND
SG12 36-3	6/11/95	ND	ND	ND	ND	ND
SG12 40-1	6/11/95	ND	ND	ND	ND	ND
SG12 40-2	6/11/95	ND	ND	ND	ND	ND
SG12 40-3	6/11/95	ND	ND	ND	ND	ND
SG12 41-1	6/11/95	ND	ND	ND	ND	ND
SG12 41-2	6/11/95	ND	ND	ND	ND	ND
SG12 41-3	6/11/95	ND	ND	ND	ND	ND
SG12 38-1	6/11/95	ND	ND	ND	ND	ND
SG12 38-2	6/11/95	ND	ND	ND	ND	ND
SG12 38-3	6/11/95	ND	ND	ND	ND	ND
SG12 39-1	6/11/95	ND	ND	ND	ND	ND
SG12 39-2	6/11/95	ND	ND	ND	ND	ND
SG12 39-3	6/11/95	ND	ND	ND	ND	ND
SG12 37-1	6/11/95	ND	ND	ND	ND	ND
SG12 37-2	6/11/95	5.03	ND	ND	ND	ND
SG12 37-3	6/11/95	60.26	ND	ND	ND	16.17
SG12 37-3 DUP	6/11/95	56.27	ND	ND	ND	14.51
SG12 37-3DUP2	6/11/95	47.22	ND	ND	ND	12.33
SG12 44-1	6/11/95	ND	ND	ND	ND	ND
SG12 44-2	6/11/95	ND	ND	ND	ND	ND
SG12 44-3	6/11/95	ND	ND	ND	ND	ND
511 BLK	6/11/95	ND	ND	ND	ND	ND

Soil Gas

FINAL DATA

SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

UNITS = microgram per liter of air (ug/L of Air) DETECTION LIMIT = 4.00 ug/L of Air

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	TOTAL XYLENES
512 BLK	6/12/95	ND	ND	ND	ND	ND
SG12 42-1	6/12/95	ND	ND	ND	ND	ND
SG12 42-2	6/12/95	ND	ND	ND	ND	ND
SG12 42-3	6/12/95	ND	ND	ND	ND	ND
SG12 43-1	6/12/95	4.07	ND	ND	ND	ND
SG12 43-2	6/12/95	ND	ND	ND	ND	ND
SG12 43-3	6/12/95	ND	ND	ND	ND	ND
SG12 45-1	6/12/95	ND	ND	ND	ND	ND
SG12 45-2	6/12/95	ND	ND	ND	ND	ND
SG12 45-3	6/12/95	ND	ND	ND	ND	ND
SG12 48-1	6/12/95	ND	ND	ND	ND	ND
SG12 48-2	6/12/95	ND	ND	ND	ND	ND
SG12 48-3	6/12/95	ND	ND	ND	ND	ND
SG12 47-1	6/12/95	3.84	ND	ND	ND	ND
SG12 47-2	6/12/95	37.18	ND	ND	5.04	14.68
SG12 47-3	6/12/95	71.99	ND	ND	8.94	24.10
SG12 47-3 DUP	6/12/95	56.53	ND	ND	13.75	24.25
SG12 50-1	6/12/95	141.16	ND	ND	19.37	34.86
SG12 50-1 DUP	6/12/95	88.92	ND	ND	11.28	22.93
SG12 50-2	6/12/95	83.70	ND	ND	11.79	23.63
SG12 50-3	6/12/95	8.42	ND	ND	ND	ND
SG12 46-1	6/12/95	6.34	ND	ND	ND	ND
SG12 46-2	6/12/95	ND	ND	ND	ND	ND
SG12 46-3	6/12/95	6.20	ND	ND	ND	ND
SG12 49-1	6/12/95	ND	ND	ND	ND	ND
SG12 49-2	6/12/95	44.60	ND	ND	4.69	18.16
SG12 49-3	6/12/95	40.71	ND	ND	ND	17.69
513 BLK	6/12/95	ND	ND	ND	ND	ND

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	TOTAL XYLENES	SOLVENT
515 BLK	6/14/95	ND	ND	ND	ND	ND	ND
SG13 6-1	6/14/95	ND	ND	ND	ND	ND	ND
SG13 6-2	6/14/95	ND	ND	ND	ND	ND	ND
SG13 6-3	6/14/95	ND	ND	ND	ND	ND	ND

FINAL QC DATA

SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

UNITS = microgram per liter of air (ug/L of Air) DETECTION LIMIT = 4.00 ug/L of Air

Duplicate Analysis

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	TOTAL XYLENES	SOLVENT
SG1-1	6/8/95	ND	ND	ND	ND	ND	ND
SG1-1 DUP	6/8/95	ND	ND	ND	ND	ND	ND
	RPD	N/A	N/A	N/A	N/A	N/A	N/A
SG12 11-1	6/9/95	ND	ND	ND	ND	0.70	
SG12 11-1 DUP	6/9/95	ND	ND	ND	ND	0.71	
	RPD	N/A	N/A	N/A	N/A	1%	

Soil Gas
FINAL QC DATA
SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

UNITS = microgram per liter of air (ug/L of Air) DETECTION LIMIT = 4.00 ug/L of Air

Duplicate Analysis

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	TOTAL XYLENES
SG12 18-3	6/10/95	ND	ND	ND	ND	ND
SG12 18-3DUP	6/10/95	ND	ND	ND	ND	ND
	RPD	N/A	N/A	N/A	N/A	N/A
SG12 19-2	6/10/95	391.73	ND	ND	10.56	59.20
SG12 19-2DUP	6/10/95	355.25	ND	ND	7.11	55.94
	RPD	10%	N/A	N/A	39%	6%
SG12 19-3	6/10/95	251.93	ND	ND	6.36	36.00
SG12 19-3DUP	6/10/95	173.73	ND	ND	5.57	24.74
	RPD	37%	N/A	N/A	13%	37%
SG12 37-3	6/11/95	60.26	ND	ND	ND	16.17
SG12 37-3 DUP	6/11/95	56.27	ND	ND	ND	14.51
	RPD	7%	N/A	N/A	N/A	11%
SG12 37-3	6/11/95	60.26	ND	ND	ND	16.17
SG12 37-3DUP2	6/11/95	47.22	ND	ND	ND	12.33
	RPD	24%	N/A	N/A	N/A	27%
SG12 47-3	6/12/95	71.99	ND	ND	8.94	24.10
SG12 47-3 DUP	6/12/95	56.53	ND	ND	13.75	24.25
	RPD	24%	N/A	N/A	42%	1%
SG12 50-1	6/12/95	141.16	ND	ND	19.37	34.86
SG12 50-1 DUP	6/12/95	88.92	ND	ND	11.28	22.93
	RPD	45%	N/A	N/A	53%	41%

Opening and Closing Standards Analysis

SAMPLE ID	DATE	TPH	BENZ	TOL	EBENZ	M- & P-XYLENES	O-XYLENE
OPENING STD	6/8/95	99.08	30.52	35.54	48.14	90.98	45.93
CLOSING STD	6/8/95	77.52	26.11	27.28	30.56	69.94	37.96
	RPD (%)	24%	16%	26%	45%	26%	19%
OPENING STD	6/9/95	99.08	30.52	35.54	48.14	90.98	45.93
CLOSING STD	6/9/95	79.65	48.52	73.95	107.77	223.02	113.55
	RPD (%)	22%	46%	70%	76%	84%	85%
OPENING STD	6/10/95	99.08	30.52	35.54	48.14	90.98	45.93
CLOSING STD	6/10/95	119.17	38.01	32.85	39.10	66.99	33.64
	RPD (%)	18%	22%	8%	21%	30%	31%
OPENING STD	6/11/95	99.08	30.52	35.54	48.14	90.98	45.93
CLOSING STD	6/11/95	90.45	32.99	40.23	61.59	100.62	54.04
	RPD (%)	9%	8%	12%	25%	10%	16%
OPENING STD	6/12/95	99.08	30.52	35.54	48.14	90.98	45.93
CLOSING STD	6/12/95	99.42	38.29	51.64	74.49	79.42	72.82
	RPD (%)	0%	23%	37%	43%	14%	45%
OPENING STD	6/14/95	99.08	30.52	35.54	48.14	90.98	45.93
CLOSING STD	6/14/95	89.14	30.41	36.55	64.56	96.13	44.26
	RPD (%)	11%	0%	3%	29%	5%	4%

Soil Gas

FINAL QC DATA

SAIC Project # 01-0827-04-3423-008 @

South Dakota Air National Guard Station

Sioux Falls, SD

UNITS = microgram per liter of air (ug/L of Air)   DETECTION LIMIT = 4.00 ug/L of Air

	Solvent Calibration			Solvent Duplicate Analyses		
Solvent Analyte	Ave. RF from 3-pt.	SD of RF from 3-pt.	RSD (%)	SG1-1	SG1-1DUP	RPD (%)
1,1-Dichloroethene	324.03	84.31	26.0%	ND	ND	N/A
Methylene Chloride	459.83	130.34	28.3%	ND	ND	N/A
trans-1,2-Dichloroethene	393.95	59.68	15.1%	ND	ND	N/A
1,1-Dichloroethane	728.95	155.98	21.4%	ND	ND	N/A
cis-1,2-Dichloroethene	510.07	150.06	29.4%	ND	ND	N/A
Chloroform	808.28	207.61	25.7%	ND	ND	N/A
1,1,1-Trichloroethane	575.85	133.73	23.2%	ND	ND	N/A
Carbon Tetrachloride	841.40	230.10	27.3%	ND	ND	N/A
1,2-Dichloroethane	803.11	204.11	25.4%	ND	ND	N/A
Benzene	28.73	5.92	20.6%	ND	ND	N/A
Trichloroethene	463.89	68.55	14.8%	ND	ND	N/A
Toluene	25.07	4.19	16.7%	ND	ND	N/A
1,1,2-Tricloroethane	778.30	209.51	26.9%	ND	ND	N/A
Tetrachloroethene	341.44	37.58	11.0%	ND	ND	N/A
Chlorobenzene	172.63	15.83	9.2%	ND	ND	N/A
1,1,1,2-Tetrachloroethane	854.09	231.08	27.1%	ND	ND	N/A
Ethylbenzene	20.47	3.35	16.4%	ND	ND	N/A
m- & p-Xylene	22.63	3.47	15.4%	ND	ND	N/A
o-Xylene	21.39	3.16	14.8%	ND	ND	N/A
1,1,2,2-Tetrachloroethane	772.91	206.19	26.7%	ND	ND	N/A

Calibration Date: 6/8/95

Dup. Analysis: 6/8/95

ANALYSES PERFORMED IN TEG-MIDWEST'S MOBILE LABORATORY

ANALYSES PERFORMED BY: MR. JEFFREY E. FILKINS

DATA REVIEWED BY: MR. JEFFREY E. FILKINS 7/7/95

Area 12 - Soils
FINAL DATA
SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

TEG Project #950607MW

TPH (Mod. EPA Method 8015) & BTEX (EPA Method 8020) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS (C5-C12) (mg/kg)	TPH-DIESEL (C13-C24) (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBEN. (mg/kg)	TOTAL XYLENES (mg/kg)
REAGENT BLAN.	06/13/95	ND	ND	ND	ND	ND	ND
GS01-1	06/13/95	ND	ND	ND	ND	ND	ND
GS01-2	06/13/95	ND	ND	ND	ND	ND	ND
GS01-3	06/13/95	ND	ND	ND	ND	ND	ND
GS02-1	06/13/95	ND	ND	ND	ND	ND	ND
GS02-2	06/13/95	ND	ND	ND	ND	ND	ND
GS02-3	06/13/95	ND	ND	ND	ND	ND	ND
GS03-1	06/13/95	ND	10	ND	ND	ND	ND
GS03-2	06/13/95	ND	ND	ND	ND	ND	ND
GS03-3	06/13/95	ND	ND	ND	ND	ND	ND
GS04-1	06/13/95	ND	ND	ND	ND	ND	ND
GS04-2	06/13/95	ND	ND	ND	ND	ND	ND
GS04-3	06/13/95	ND	ND	ND	ND	ND	ND
GS05-1	06/13/95	ND	ND	ND	ND	ND	ND
GS05-2	06/13/95	ND	5	ND	ND	ND	ND
GS05-2 DUP	06/13/95	ND	7	ND	ND	ND	ND
GS05-3	06/13/95	ND	10	ND	ND	ND	ND
DETECTION LIMITS		5.0	5.0	0.10	0.10	0.10	0.10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

QC DATA - MATRIX SPIKE ANALYSIS - SOILS (mg/kg)

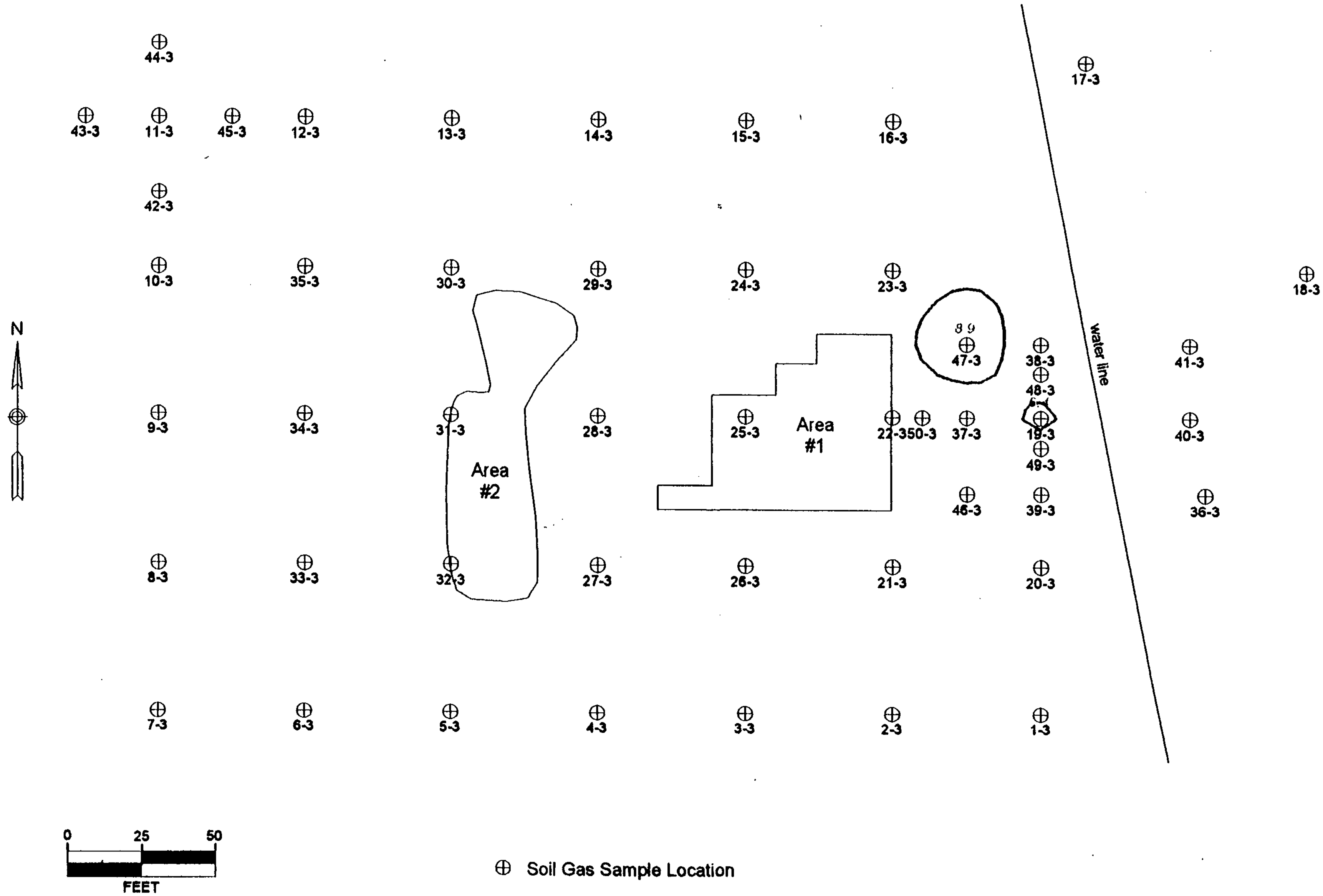
Spiked Conc.	06/13/95	200	500	1.000	1.000	1.000	3.000
Measured Conc.		250	623	1.125	1.221	1.147	3.891
% Recovery		125.0%	124.6%	112.5%	122.1%	114.7%	129.7%
Spiked Conc.	06/13/95	200	500	1.000	1.000	1.000	3.000
Measured Conc.		212	544	0.893	0.980	0.955	3.059
% Recovery		106.0%	108.8%	89.3%	98.0%	95.5%	102.0%
RPD		16.5%	13.5%	23.0%	21.9%	18.3%	23.9%

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

ANALYSES PERFORMED IN TEG-MIDWEST'S MOBILE LABORATORY

ANALYSES PERFORMED BY: MR. JEFFREY E. FILKINS

DATA REVIEWED BY: MR. JEFFREY E. FILKINS 06/14/95



CONCENTRATION CONTOUR KEY

4

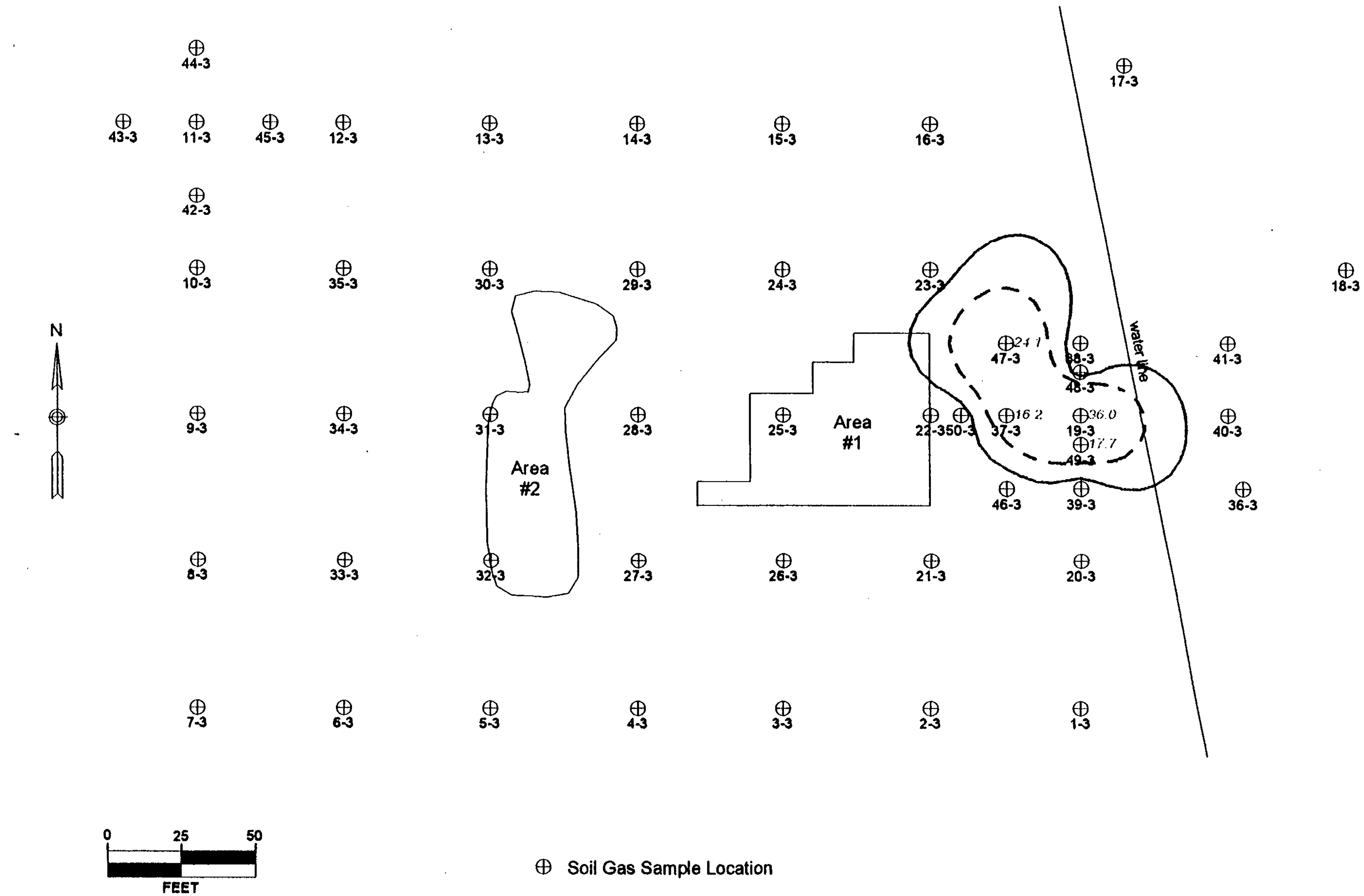
10

TARGET ENVIRONMENTAL SERVICES, INC.

This map is integral to a written report and should be viewed in that context.

FIGURE 11. Ethylbenzene (ug/l-v)

AREA 12 SITE SOIL GAS, 6'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA



TARGET ENVIRONMENTAL SERVICES, INC.

This map is integral to a written report and should be viewed in that context.

FIGURE 12. Xylenes (ug/l-v)

AREA 12 SITE SOIL GAS, 6'
SOUTH DAKOTA AIR NATIONAL GUARD STATION
SIOUX FALLS, SOUTH DAKOTA

Area 13 - Waters

FINAL DATA

SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

TEG Project #950607MW

TPH (Mod. EPA 8015), BTEX (EPA 8020) & SOLVENT (EPA 3810/8010) ANALYSES OF WATERS

SAMPLE ID	DATE	TPH Gasoline (ug/L)	TPH Diesel (ug/L)	BENZ (ug/L)	TOL (ug/L)	EBENZ (ug/L)	TOTAL XYLENES (ug/L)	SOLVENT (ug/L)
MBLK 6/14	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1301	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1302	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1303	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1304	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1305	6/14/95	ND	ND	4.5	20.8	3.1	17.4	ND
GW1306	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1307	6/14/95	ND	ND	ND	6.4	ND	7.4	ND
GW1308	6/14/95	ND	ND	ND	4.3	ND	8.1	ND
GW1309	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1310	6/15/95	ND	ND	ND	ND	ND	ND	ND
GW1311	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1312	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1313	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1314	6/14/95	ND	ND	ND	ND	ND	ND	ND
GW1315	6/15/95	ND	ND	ND	ND	ND	ND	ND
GW1316	6/15/95	ND	ND	ND	ND	ND	ND	ND
GW1317	6/15/95	ND	ND	ND	ND	ND	ND	ND
GW1318	6/15/95	ND	ND	ND	ND	ND	ND	ND
GW1319	6/15/95	ND	ND	ND	ND	ND	ND	ND
GW1319 DUP	6/15/95	ND	ND	ND	ND	ND	ND	ND
GW1320	6/15/95	ND	ND	ND	ND	ND	ND	ND
600 BLK (EOD)	6/15/95	ND	ND	ND	ND	ND	ND	ND
DETECTION LIMITS		500	500	1.0	1.0	1.0	1.0	1.0

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

FINAL QC DATA

SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

TEG Project #950607MW

QC DATA - MATRIX SPIKE ANALYSIS - WATERS (ug/L)

	DATE	TPH Gasoline (ug/L)	TPH Diesel (ug/L)	BENZ (ug/L)	TOL (ug/L)	EBENZ (ug/L)	TOTAL XYLENES (ug/L)
Spiked Conc.	6/18/95	1500	3000	10.0	10.0	10.0	30.0
Measured Conc.		1273	2946	9.3	9.8	9.2	30.4
% Recovery		84.9%	98.2%	93.0%	98.0%	92.0%	101.4%
Spiked Conc.	6/18/95	1500	3000	10.0	10.0	10.0	30.0
Measured Conc.		1225	2748	8.3	9.8	9.7	28.2
% Recovery		81.7%	91.6%	83.0%	98.0%	97.0%	94.2%
RPD		3.8%	7.0%	11.4%	0.0%	5.3%	7.4%

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

Area 13 - Waters
FINAL QC DATA
SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

TEG Project #950607MW

QC DATA - MATRIX SPIKE ANALYSIS - WATERS (ug/L)

Solvent Analyte	Spiked Conc.	MS Measured Conc.	% Recovery	MSD Measured Conc.	% Recovery	RPD (%)
1,1-Dichloroethene	10.0	9.8	98.0%	12.5	125.0%	24.2%
Methylene Chloride	10.0	7.6	76.0%	7.3	73.0%	4.0%
trans-1,2-Dichloroethene	10.0	8.8	88.0%	8.6	86.0%	2.3%
1,1-Dichloroethane	10.0	8.3	83.0%	7.7	77.0%	7.5%
cis-1,2-Dichloroethene	10.0	8.8	88.0%	7.9	79.0%	10.8%
Chloroform	10.0	8.3	83.0%	8.0	80.0%	3.7%
1,1,1-Trichloroethane	10.0	7.6	76.0%	6.6	66.0%	14.1%
Carbon Tetrachloride	10.0	7.4	74.0%	7.3	73.0%	1.4%
1,2-Dichloroethane	10.0	9.3	93.0%	8.2	82.0%	12.6%
Trichloroethene	10.0	9.4	94.0%	9.7	97.0%	3.1%
1,1,2-Tricloroethane	10.0	8.0	80.0%	4.6	46.0%	54.0%
Tetrachloroethene	10.0	10.1	101.0%	10.3	103.0%	2.0%
Chlorobenzene	10.0	9.2	92.0%	9.5	95.0%	3.2%
1,1,1,2-Tetrachloroethane	10.0	10.0	100.0%	9.8	98.0%	2.0%
1,1,2,2-Tetrachloroethane	10.0	NA	NC	NA	NC	N/A

NA = Not Analyzed
NC = Not Calculated
N/A = Not Applicable

ANALYSES PERFORMED IN TEG-MIDWEST'S MOBILE LABORATORY

ANALYSES PERFORMED BY: MR. JEFFREY E. FILKINS

DATA REVIEWED BY: MR. JEFFREY E. FILKINS 7/10/95

Area 13 - Soils

FINAL DATA
SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

TEG Project #950607MW

TPH (Mod. EPA 8015), BTEX (EPA 8020) & SOLVENT (EPA 8010) ANALYSES OF SOILS

SAMPLE ID	DATE	TPH Gasoline (mg/Kg)	TPH Diesel (mg/Kg)	BENZ (mg/Kg)	TOL (mg/Kg)	EBENZ (mg/Kg)	TOTAL XYLENES (mg/Kg)	SOLVENT (mg/Kg)
MBLK 6/16	6/17/95	ND	ND	ND	ND	ND	ND	ND
GS13-1-1	6/17/95	ND	ND	ND	ND	ND	ND	ND
GS13-1-2	6/17/95	ND	ND	ND	ND	ND	ND	ND
GS13-1-3	6/17/95	ND	ND	ND	ND	ND	ND	ND
GS13-1-4	6/17/95	ND	ND	ND	ND	ND	ND	ND
GS13-2-1	6/17/95	ND	ND	ND	ND	ND	ND	ND
GS13-2-2	6/17/95	ND	ND	ND	ND	ND	ND	ND
GS13-2-3	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-2-4	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-3-1	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-3-2	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-3-3	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-3-4	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-4-1	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-4-2	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-4-3	6/18/95	ND	ND	ND	ND	ND	ND	ND
GS13-4-4	6/18/95	ND	ND	ND	ND	ND	ND	ND
DETECTION LIMITS		5.0	5.0	0.10	0.10	0.10	0.10	0.10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

FINAL DATA
SAIC Project # 01-0827-04-3423-008 @
South Dakota Air National Guard Station
Sioux Falls, SD

TEG Project #950607MW

QC DATA - MATRIX SPIKE ANALYSIS - SOILS (ug/Kg)

	DATE	TPH Gasoline (ug/Kg)	TPH Diesel (ug/Kg)	BENZ (ug/Kg)	TOL (ug/Kg)	EBENZ (ug/Kg)	TOTAL XYLENES (ug/Kg)
Spiked Conc.	6/18/95	200	500	1.00	1.00	1.00	3.00
Measured Conc.		212	539	0.69	0.74	0.62	2.28
% Recovery		106.0%	107.8%	69.2%	73.8%	62.0%	76.0%
Spiked Conc.	6/18/95	200	500	1.00	1.00	1.00	3.00
Measured Conc.		223	544	0.69	0.71	0.64	2.12
% Recovery		111.5%	108.8%	68.9%	71.0%	63.7%	70.7%
RPD		5.1%	0.9%	0.5%	3.8%	2.8%	7.2%

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

APPENDIX B. GEOPROBE LOGS

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Field Boring Log

Site File No.	County Minnehaha	Boring No. GS01	Monitor Well No. N/A
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth N/A
Fed ID No.		Auger Depth	Rotary Depth
State Planar Coordinates: N. E.		Date: Start 6/13/95 Time 1115	Finish 6/13/95 Time 1230
Borehole status (BSTAT)*:		Ground water Depth:	Method (See back):
Drilling Equipment: GEOPROBE		Surface (Circle one): Bare CONCRETE Grassy Wooded	

Personnel
G - M. CRAMER
D - D. STARLING
H -
H -

Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
		2							
SP	SAND, SOME SILT, LIGHT BROWN, SOFT DRY 7.5YR6/3 Lt. Brown	4	DRY	GS01-1	1.5/2			0ppm	
	SAND, FINE TO COARSE GRAINED, LOOSE, TRACE GRAVEL, DRY	6	DRY	GS01-2	1.8/2			0ppm	
SP	SAME AS ABOVE, BUT WET.	8	WET	GS01-3	1.8/2			0ppm	

SAIC Field Boring Log

Site File No.	County Minnehaha	Boring No. GSØ2	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth	Rotary Depth
State Planar Coordinates: N.	E.	Date: Start 6/13/95 Time 1425	Finish 6/13/95 Time 15ØØ
Borehole status (BSTAT)*:		Ground water Depth:	Method (See back):
Drilling Equipment: GEOPROBE		Surface (Circle one): ~~Bare~~ Concrete	Grassy Wooded

Personnel:
G - M. CRAMER
D - D. STARLING
H -
H -

* Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	CONCRETE	2							
SC	2-2.8' CLAY AND SAND, BROWN, SOFT, FINE TO MEDIUM GRAINED SAND, DRY 7.5YR4/3 Brown		DRY	GSØ2-1	1.25/2		NA	Øppm	
SP	2.8-4.Ø SAND, FINE TO MEDIUM GRAINED, VERY LOOSE, BROWN MOTTLED WITH BLACK, DRY 7.5YR4/3 with 7.5YR2.5/1	4.Ø							
SP	SAND, FINE TO COARSE GRAINED, BROWN, TRACE GRAVEL, VERY LOOSE, DAMP 7.5YR4/3	6.Ø	DAMP	GSØ2-2	1.4/2		NA	Øppm	
SP / GP	6.0-6.2' SAME AS ABOVE. 6.2-6.25 GRAVEL, UP TO 25 mm. 6.25-8.0 SAME AS 4' TO 6' WITH LITTLE GRAVEL AND WET.	8.Ø	WET	GSØ2-3	1.8/2		NA	Øppm	
	END OF BORING								

Field Boring Log

Site File No.	County Minnehaha	Boring No. GS03	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth	Rotary Depth
State Planar Coordinates: N.	E.	Date: Start 6/13/95 Time 1520	Finish 6/13/95 Time 1600
Borehole status (BSTAT)*:		Ground water Depth:	Method (See back):
Drilling Equipment: GEOPROBE		Surface (Circle one): ~~Bare~~ Concrete	Grassy Wooded

Refer to back of page

Personnel
G- M. CRAMER
D- D. STARLING
H-
H-

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	CONCRETE	2.0							
SC	2.0-2.2- SAND AND CLAY, BROWN, LOOSE, DRY 7.5YR4/3		DRY	GS03-1	1.6/2		NA	0ppm	
SP	2.2-4.0 - SAND, FINE TO MEDIUM GRAINED, BROWN 7.5YR4/3 LITTLE GRAVEL, LOOSE, DRY.	4.0							
SP	SAND, FINE TO MEDIUM GRAINED, BROWN TO GREYISH BROWN, LITTLE GRAVEL, LOOSE, SLIGHTLY DAMP. 10YR5/3 to 10YR5/2	6.0	Slightly Damp	GS03-2	1.8/2		NA	0ppm	
SP	SAME AS ABOVE, ONLY BROWN AND WET 10YR5/3	8.0	WET	GS03-3	1.5/2		NA	0ppm	

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Field Boring Log

Site File No.	County Minnehaha	Boring No. GSØ4	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth	Rotary Depth
State Planar Coordinates: N.	E.	Date: Start 6/13/95 Time 1717 Finish 6/13/95 Time 175Ø	

Borehole status (BSTAT)*:

Ground water Depth: Method (See back):

Drilling Equipment: GEOPROBE

Surface (Circle one): Bare Concrete Grassy Wooded

Personnel:
G- M. CRAMER
D- D. STARLING
H-
H-

* Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	CONCRETE								
		2Ø							
SC	2.0-2.6 CLAY & SAND, FINE GRAINED SAND, DARK BROWN, TRACE GRAVEL, LOOSE, DRY. 10YR 3/3		DRY	GS04-1	1.8/2.Ø		NA	Øppm	
SP	2.6-4.0 SAND, FINE TO MEDIUM GRAINED, LIGHT BROWN TO DARK BROWN, LOOSE, DRY. 10YR 6/3 to 10YR 3/3								
		4Ø							
GP	4.0-4.05 GRAVEL								
SP	4.1-6.0 SAND, FINE TO MEDIUM GRAINED, BROWN, LOOSE, DRY 10YR 5/3		DRY	GS04-2	1.8/2.Ø		NA	Øppm	
		6Ø							
SP	SAME AS ABOVE WITH SOME FINE TO COARSE GRAVEL, AND WET.		WET	GS04-3	1.4/2.0		NA	Øppm	
		8Ø							
	END OF BORING.								

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Field Boring Log

Site File No.	County Minnehaha	Boring No. GS05	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth	Rotary Depth
State Planar Coordinates: N.	E.	Date: Start 6/13/95 Time 1810	Finish 6/13/95 Time 1850

Borehole status (BSTAT)*:

Ground water Depth: Method (See back):

Drilling Equipment:

Surface (Circle one): Bare Concrete Grassy Wooded

* Refer to back of page

Personnel: G- M. CRAMER; D- D. STARLING; H- ; H-

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Top 3" Concrete, Rest of INTERVAL NOT TAKEN.	2							
SC	CLAY SOME SAND, DARK BROWN, MODERATELY PLASTIC, 10YR3/3 MEDIUM STIFF, FINE GRAINED SAND, DRY		Dry to	GS05-1	1.6/2			2ppm	
SP	3.1' - SAND, FINE TO MEDIUM GRAINED, TRACE FINE GRAVEL, BROWN, TO LIGHT BROWN, LOOSE, DAMP 10YR5/3 to 10YR6/3	4.0	Damp						
SP	SAME AS ABOVE, ONLY SLIGHTLY MORE DAMP	6.0	Damp	GS05-2	1.8/2			7ppm	
SP	SAME AS ABOVE, WITH 6.3' to 6.4' BLACK 10YR2/1 6.4' - SAME AS ABOVE WITH MEDIUM TO COARSE GRAINED SAND, WET	8.0	WET	GS05-3	1.9/2			3ppm	

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Field Boring Log

Site File No.	County Minnehaha	Boring No. GS13-1	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 9' bgs
Fed ID No.		Auger Depth NA	Rotary Depth NA
State Planar Coordinates: N.	E.	Date: Start 6/15/95 Time 1330	Finish 6/15/95 Time 1420

Borehole status (BSTAT)*:

Ground water Depth: Method (See back):

Surface (Circle one): Bare Asphalt (circled) Grassy Wooded

Drilling Equipment: Geoprobe

* Refer to back of page

Personnel: G - M. Cramer; D - D. Starling; H -; H -

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	ASPHALT - INTERVAL NOT TAKEN	0–1							
GP	Sand and Gravel, Brown to Rusty Brown, Fine to Course Sand, Loose, Slightly, Damp 10YR 5/3 to 5YR 4/3	1–2		GS13-1-1	70%			0ppm	
CL	Gravel layer, Clay, Black, Plastic, Trace Silt, Dry, Medium Stiff 10YR 2/1	2–3							
CL	SAME AS ABOVE	3–5		GS13-1-2	100%			0ppm	
CL	Clay, Some Sand, Trace Gravel, Light Olive Brown mottled with beige, Moderate Plastic, Soft, Trace Iron Staining, Dry to Slightly Damp 2.5Y 5/4	5–7		GS13-1-3	90%			0ppm	
CL	SAME AS ABOVE	7–7.75'		GS13-1-4	100%			0ppm	
SC	Sand and Clay, Fine to Med., Moderate Plastic, Soft, Wet	7.75'–9							
		9							Bottom of Boring 9' bgs

Field Boring Log

Site File No.	County Minnehaha	Boring No. GS13 - 2	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth NA	Rotary Depth NA
State Planar Coordinates: N.	E.	Date: Start 6/15/95 Time 1450	Finish 6/15/95 Time 1600
Borehole status (BSTAT)*:		Ground water Depth:	Method (See back):
Drilling Equipment: Geoprobe		Surface (Circle one): Bare Asphalt	Grassy Wooded

*Refer to back of page

Personnel:
G - M. Cramer
D - D. Starling
H -
H -

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Asphalt	0–1							
GP	1.0-1.25' Sand and Gravel, Brown to Rusty Brown, Fine to Course, Sand Damp 10YR 5/3 to 5YR 4/3	1–3		GS13-2-1	40%			Ø ppm	
CL	1.25-1.75' Black Clay, Trace Silt, Plastic, Dry, Med. Stiff 7.5YR 2.5/1								
CL	SAME AS ABOVE	3–5			95%			NR	
CL	5.0-5.5' SAME AS ABOVE	5–7			90%			NR	
CL	5.5-6.7' Clay, trace gravel, some sand, moderate plastic, soft, Dry to slightly Damp								
SC	Clay & Sand, Some Silt, Med. Plastic, soft	7–9			70%			NR	
SP	8.8-9.0' Sand Fine to Med, Loose, Wet								

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Field Boring Log

Site File No.	County Minnehaha	Boring No. GS13-3	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 9' bgs
Fed ID No.		Auger Depth NA	Rotary Depth N/A
State Planar Coordinates: N.	E.	Date: Start 6/15/95 Time 1622	Finish 6/15/95 Time 1736
Borehole status (BSTAT)*:		Ground water Depth:	Method (See back):
Drilling Equipment: Geoprobe		Surface (Circle one): Bare Asphalt / Grassy / Wooded	

Personnel:
G- M. Cramer
D- D. Starling
H-
H-

* Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Asphalt	0–1							
GP	1.0-1.8' Sand and Gravel, Lt. Brown, Fine to Course Sand, Loose, Dry 7.5YR 6/3	1		GS13-3-1	55%			10ppm	
SC	1.8-3.0' Sand and Clay, some Silt, Gray, Plastic, Med. Stiff, Dry 7.5YR 5/1								
CL	Clay, Some Silt, Black, Med. Stiff, Dry 7.5YR 2.5/1	3		GS13-3-2	95%			Øppm	
CL	SAME AS ABOVE, except Medium Brown	5		GS13-3-3	45%			Øppm	
GP	5.5-6.2 Sand and Gravel, Loose, Damp								
CL	Clay, Some Silt, Trace Fine Sand, Med. Brown to Black, Med. Plastic, Soft, Damp to Wet	7		GS13-3-4	100%			Øppm	
		9							Bottom of Boring

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Field Boring Log

Site File No.	County Minnehaha	Boring No. GS13-4	Monitor Well No. NA
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth NA	Rotary Depth NA
State Planar Coordinates: N.	E.	Date: Start 6/15/95 Time 1750	Finish 6/15/95 Time 1830

Borehole status (BSTAT)*:

Ground water Depth: Method (See back):

Surface (Circle one): Bare Asphalt Grassy Wooded

Drilling Equipment: Geoprobe

Personnel:
G - M. Cramer
D - D. Starling
H -
H -

*Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Asphalt	0–1							
GP	1.0-1.25' Sand and Gravel, Brown to Rusty Brown, Fine to Course Sand, Loose, Dry, 10YR5/3 to 5YR4/3	1–3		GS13-4-1	40%			1 ppm	
CL	1.25-1.75' Clay, Black, Plastic, Trace Silt, Dry, Medium Stiff 10YR2/1								
CL	SAME AS ABOVE	3–5		GS13-4-2	100%			Øppm	
CL	SAME AS ABOVE EXCEPT SOME SILT AND COLOR Change to Lt. Olive Brown 2.5Y5/4	5–7		GS13-4-3	100%			.5ppm	
SC	7.0-8.4' Clay and Sand, Some Silt, Med. Plastic, Soft, Light Olive Brown 2.5Y5/4	7–9		GS13-4-4	100%			1 ppm	
SP	8.4-9.0' Sand, Fine to Med., Loose, Wet								
		9							Bottom of Boring

APPENDIX C. PIEZOMETER LOGS AND CONSTRUCTION DIAGRAMS

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Field Boring Log

Site File No.	County Minnehaha	Boring No. PZØ1	Monitor Well No. PZØ1
ite File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 15.8' bgs
Fed ID No.		Auger Depth 15' bgs	Rotary Depth NA
tate Planar Coordinates: N. E.		Date: Start 7/11/95 Time 1530	Finish 7/11/95 Time 1735
Borehole status (BSTAT)*:	Ground water Depth:	Method (See back):	
rilling Equipment:	Surface (Circle one):	Bare Grassy	Wooded

Acker Hollow Stem Auger Drill Rig
4" ID Hollow Stem Augers
2" OD Split Spoon
140 lb Hammer

* Refer to back of page

Personnel:
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D./ LEL Readings	REMARKS
T	0'-0.5' 10YR 2/1 Black Humus, Some Sand, Semi Plastic, Damp	0–2			25%		3 4 4 8	Øppm	HNu Background Reading Øppm
T	2.0-2.4' Same As Above with more sand	2–4			60%		4 5 5 6	Øppm	
SP	2.4-3.0' 10YR 3/3 Dark Brown, Sand, med to course, non cohesive, damp								
P	3.0-3.2' Same As Above, Sand Course								
SP	4.0-5.85' Same As Above grading to poorly sorted, well rounded, moist	4–6			80%		3 5 6 8	Øppm	
		6–8							Shelby Tube Collected Water level at 6' bgs
SP	8.0'-8.8' 10YR 3/3 Dark Brown, Sand, poorly sorted, Saturated	8–10			60%		3 4 5 4	Øppm	
SP	8.8'-9.3' 10YR 3/3 Dark Brown, Sand, Fine, well sorted								
P	10.Ø-11.3' 10YR 3/3 Dark Brown, Sand, med. to Course grading to fine	10–12			60%		2 2 3 5	Øppm	
P	12.0'-13.4' 10YR 3/3 Dark Brown, Sand, Fine grading to medium grading to poorly sorted course sand and gravel conglomerate	12–14			70%		3 4 4 5	Øppm	
	14.0-15.8' SAME AS ABOVE Pebble Conglomerate with some Sand	14–16			85%		4 5 5 5	Øppm	
		16							Bottom of Boring 15.8' bgs

SAIC

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 10/94
Site ID: PZ01	Installation: Joe Foss Field		Site: PZ01
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company, Inc.	
Built by: Tracey Bugg		Driller: Lyle Porter	
Comp. Start: 7/11/95	Comp. End: 7/11/95	Well Coord.:	

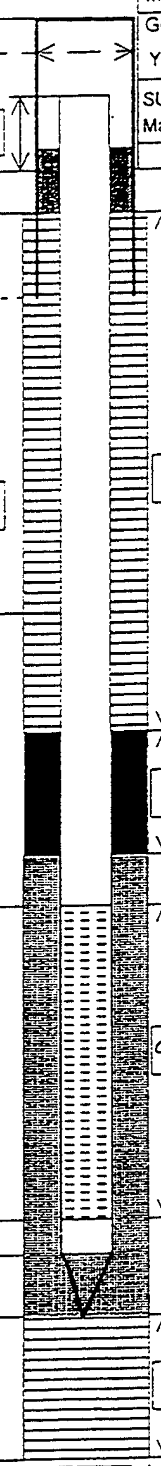
PROTECTIVE COVER Flush Mount
Material Type: Diameter of Protective Casing [CASES]: Height:
Mortar Collar Height: Depth BGS: Drainage Hole ( ) Size:

GUARD POSTS
Yes / No No.: Configuration: Type:

SURFACE PAD
Material: Size:

RISER PIPE
Type: PVC Length [CASE]: Diameter [CASED]: 2"

Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:



GROUT

Composition: Portland
Proportions:
Interval:
Method (See back):
1' Tremmied: YES NO Too Shallow

CASE No

CASED No

DEPTH (FEET)

5 Ft

SEAL (BSEAL)

2' Type: Peltonite Source:
Setup / Hydration time: 20 minutes Vol. Fluid Added: 7gal Tremied: YES NO

SCREEN (SCREN)

Type: PVC
Manufacturer: Campbell Monoflex
9.25' Diameter (ID): 2"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

GRAVEL FILTER (GFILT)

FILTER PACK
Type: Morie GA9
Amount Used: 2 bags
4' Gr. Size Dist.: 010
Source
Tremmied: YES NO

14.25 Ft.

Ft.

15 Ft.

BACKFILL PLUG (BFILL)

Material: Sand
Setup / Hydration time: NA
Method (See back) : Tremied: YES NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 15 Ft.

.38' Borehole Dia.

SAIC

Field Boring Log

Site File No.	County Minnehaha	Boring No. PZØ2	Monitor Well No. PZØ2
[Si]te File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 16' bgs
Fed ID No.		Auger Depth 16' bgs	Rotary Depth NA
[St]ate Planar Coordinates: N. E.		Date: Start 7/12/95 Time Ø815 Finish 7/12/95 Time 1Ø3Ø	
Borehole status (BSTAT)*:	Ground water Depth:	Method (See back):	
[D]rilling Equipment: Acker Hollow Stem Auger Drill Rig; 4" ID Hollow Stem Augers; 2" OD Split Spoon; 140 lb Hammer	Surface (Circle one): Bare Grassy Wooded		

Personnel:
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

* Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
PT	Ø-0.25' 10YR 3/3 to 2/1 Dark Brown to Black, Humus, low to no plasticity, Dry	0–2			10%		5 5 7 8	Øppm	Background HNu Reading Øppm
		2–4							No Split Spoon Collected
		4–6			0				Split Spoon Collected No Recovery
CH	6.0'-6.5' 10YR 2/1 Black, Clay, tight, High Plasticity, Moist	6–8			50%		4 3 3 5	Øppm	This Spoon is probably not representative of interval due to no recovery at 4'-6' interval. Water Level at 7' bgs
SP	6.5'-7.0' 10YR 5/1 Gray, Sand, med., with silt, rounded, Saturated								
		8–10							No Split Spoon Collected
CH	1Ø.Ø-1Ø.3' 10YR 2/1 Black, Clay, High Plasticity, Saturated	10–12			80%		2 3 3 4	Øppm	
SP	1Ø.3'-1Ø.9' 10YR 4/4 Lt. Yellowish Brown, Sand, Med.								
SP	10.9'-11.8' 10YR 5/1 Gray, Sand	12–14							No Split Spoon Collected
SP	14.Ø-15.5' 10YR 5/1 Gray, Sand, Fine grading to medium	14–16			90%		3 4 4 5	Øppm	
SP	15.5-15.9' 2.5Y 4/3 Olive Brown, Sand, med. to Course, Some Pebbles	16							Bottom of Boring 16' bgs

SAIC.

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 10/94
Site ID: PZ02	Installation: Joe Foss Field		Site: PZ02
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company, Inc.	
Built by: Tracey Bugg		Driller: Lyle Porter	
Comp. Start: 7/12/95	Comp. End: 7/12/95	Well Coord.:	

PROTECTIVE COVER Flush Mount
Material Type: Diameter of Protective Casing [CASES]: Height:
Mortar Collar Height: Depth BGS: Drainage Hole ( ) Size:

GUARD POSTS
Yes / No No.: Configuration: Type:

SURFACE PAD
Material: Size:

RISER PIPE
Type: PVC Length [CASE]: Diameter [CASED]:

Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:

GROUT

1'

Composition: Portland
Proportions:
Interval:
Method (See back):
Tremmied: YES NO Too Shallow

CASE No

CASED No

DEPTH (FEET)

SEAL (BSEAL)

2'

Type: Peltonite
Source:
Setup / Hydration time: 10 minutes
Vol. Fluid Added: 4 gal
Tremied: YES NO

5 Ft.

GRAVEL FILTER (GFILT)

FILTER PACK
Type: Morie GA9
Amount Used: 3½ bags
Gr. Size Dist.: for 010
Source
Trammied: YES NO

SCREEN (SCREN)

9.25'

Type: PVC
Manufacturer: Campbell Monoflex
Diameter (ID): 2"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

14.75 Ft.

Ft.

15 Ft.

BACKFILL PLUG (BFILL)

Material: Sand
Setup / Hydration time: NA
Method (See back) : Tremied: YES NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 16 Ft.

.38' Borehole Dia.

Field Boring Log

Site File No.	County Minnehaha	Boring No. PZ Ø3	Monitor Well No. PZ Ø3
[?]e File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth	Rotary Depth NA
[?]ate Planar Coordinates: N. E.		Date: Start 7/12/95 Time 123Ø Finish 7/12/95 Time 141Ø	
Borehole status (BSTAT)*:		Ground water Depth: Method (See back):	
[?]illing Equipment: Acker Hollow Stem Auger Drill Rig, 4" ID Hollow Stem Augers, 2" OD Split Spoon, 140 lb Hammer		Surface (Circle one): Bare Grassy Wooded	

Personnel:
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

* Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Core Not Logged 0-4'	0-4							Background HNu Reading 0ppm No Split Spoons Collected
CL	4.0-4.3' 10YR 2/1 Black, Clay with Silt, Low Plasticity, Moist	4-6			100%		5 13 14 16	Øppm	
SP	4.3'-5.6' 10YR 4/2 Dark Grayish Brown, Sand, med.								
SP	5.6'-6.0' Sand, Fine to Med, Dry	6-8			40%		5 5 8 13	Øppm	Water Level at 7.5' bgs.
SP	6.0'-6.8' 10YR 2/2 V. DK. Brown, Sand, Med-Course, grading to very course, saturated								
		8-10							No Split Spoon Collected
SP	10.0'-10.75' SAME AS ABOVE	10-12			80%		4 5 6 7	Øppm	
SP	10.75'-11.75' 10YR 3/3 Dark Brown, Sand, Med. Poorly Sorted, with pebble Conglomerates								
		12-14							No Split Spoon Collected
SP	14.0'-14.25' Sand, Fine to Med.	14-16			50%		6 6 7 8	Øppm	
SP	14.25-14.7' Sand, Course with pebbles conglomerates								
CL	14.7-15.1' 10YR 4/2 Dark Grayish Brown, Silt with Clay and Sand, Semi-plastic								

MONITORING WELL CONSTRUCTION LOG - Standard | Rev: 10/94

Site ID: PZØ3	Installation: Joe Foss Field	Site: PZØ3
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company
Built by: Tracey Bugg		Driller: Lyle Porter
Comp. Start: 7/12/95	Comp. End: 7/12/95	Well Coord.:

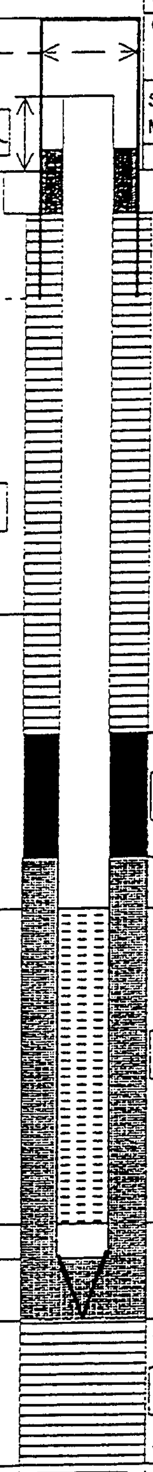
PROTECTIVE COVER Flush Mount
Material Type: Diameter of Protective Casing [CASES]: Height:
Mortar Collar Height: Depth BGS: Drainage Hole ( ) Size:

GUARD POSTS
Yes / No (No circled) No.: Configuration: Type:

SURFACE PAD
Material: Size:

RISER PIPE
Type: PVC Length [CASE]: Diameter [CASED]:

Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:



GROUT
Composition: Portland
Proportions:
Interval:
Method (See back):
1'
Tremmied: YES NO (NO circled) Too Shallow

CASE No
CASED No

DEPTH (FEET)

SEAL (BSEAL)
2'
Type: Peltonite
Source:
Setup / Hydration time: 10 minutes
Vol. Fluid Added: 3gal Tremied: YES (circled) NO

5 Ft.

GRAVEL FILTER (GFILT)
FILTER PACK
Type: Morie GA9
Amount Used: 5 bags
Gr. Size Dist.: for 010
Source
Tremmied: YES (circled) NO

SCREEN (SCREN)
9.25'
Type: PVC
Manufacturer: Campbell Monoflex
Diameter (ID): 2"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

14.25 Ft.
Ft.
15 Ft.

BACKFILL PLUG (BFILL)
Material: Sand
Setup / Hydration time: NA
Method (See back): Tremied: YES NO (NO circled)

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 16 Ft.

.38'
Borehole Dia.

APPENDIX D. MONITORING WELL LOGS AND CONSTRUCTION DIAGRAMS

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Field Boring Log

Site File No.	County Minnehaha	Boring No. MW12-Ø1	Monitor Well No. MW12-Ø1
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth	Rotary Depth NA
State Planar Coordinates: N. E.		Date: Start 7/14/95 Time 1425	Finish 7/14/95 Time 185Ø
Borehole status (BSTAT)*:	Ground water Depth:	Method (See back):	
	Surface (Circle one):	Bare Grassy Wooded	

Drilling Equipment:
Acker Hollow Stem Auger Drill Rig
8" ID Hollow Stem Augers
2" OD Split Spoon 140 lb Hammer

Personnel:
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

* Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D./ LEL Readings	REMARKS
	Core Not Logged 0-6' bgs	0							No Split Spoons Collected
SP	6.Ø'-7.7' 2.5Y4/3 Olive Brown, Sand, med., poorly sorted	6'–7'			80%		11 17 14 11	Øppm	Water Level at 7.2' bgs
		8'–9'							No Split Spoon Collected
SP	10.Ø'-11.2' 2.5Y4/3 Olive Brown, Sand, fine to medium	10'–11'			80%		5 6 10 14	Øppm	
SP	11.2'-11.7' SAME As Above Except 2.5Y4/2 Dark Grayish Brown								
		12'–13'							No Split Spoon Collected
SW	14.0'-14.75' 2.5Y3/3 Dark Olive Brown, Sand, Fine	14'–15'			95%		4 4 5 5	3ppm	
SP	14.75'-15.1' Same As Above Except Course Sand								
SW	15.1'-15.4' Same As Above Except Fine Sand								
SP	15.4'-15.65' Course with Pebbles								
SW	15.65'-15.9' 2.5Y Dark Gray Fine Sand	16'							Bottom of Boring 16' bgs

SAIC

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 10/94
Site ID: MW12-Ø1	Installation: Joe Foss Field		Site: MW12-Ø2
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company, Inc.	
Built by: Tracey Bugg		Driller: Lyle Porter	
Comp. Start: 7/14/95	Comp. End: 7/14/95	Well Coord.:	

PROTECTIVE COVER Flush Mount
Material Type: Diameter of Protective Casing [CASES]: Height:
Mortar Collar Height: Depth BGS: Drainage Hole ( ) Size:

GUARD POSTS
Yes / No No.: Configuration: Type:

SURFACE PAD
Material: Size:

RISER PIPE
Type: PVC Length [CASE]: Diameter [CASED]:

Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:

CASE No

CASED No

DEPTH (FEET)

5 Ft

GROUT

Composition: Portland
Proportions:
Interval:
Method (See back):
1' Tremmied: YES NO Too Shallow

SEAL (BSEAL)

2' Type: Peltonite Source:
Setup / Hydration time: 25 minutes Vol. Fluid Added: 3gal Tremied: YES NO

SCREEN (SCREN)

Type: PVC
Manufacturer: Campbell Monoflex
9.25' Diameter (ID): 4"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

GRAVEL FILTER (GFILT)

FILTER PACK
Type: Morie GA9
Amount Used: 4½ bags
7' Gr. Size Dist.: for 010
Source
Tremmied: YES NO

14.25 Ft.

NA Ft.

15 Ft.

BACKFILL PLUG (BFILL)

Material:
.08' Setup / Hydration time:
Method (See back): Tremied: YES NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 16 Ft

.85' Borehole Dia.

SAIC

Field Boring Log

Site File No.	County Minnehaha	Boring No. MW12-Ø2	Monitor Well No. MW12-Ø2
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 16' bgs
Fed ID No.		Auger Depth 16' bgs	Rotary Depth NA
State Planar Coordinates: N.	E.	Date: Start 7/15/95 Time Ø725	Finish 7/15/95 Time Ø900
Borehole status (BSTAT)*:		Ground water Depth:	Method (See back):
Drilling Equipment: Acker Hollow Stem Auger Drill Rig; 8" ID Hollow Stem Augers; 2" OD Split Spoon 140 lb Hammer		Surface (Circle one): Bare Grassy Wooded	

* Refer to back of page

Personnel:
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Core Not Logged 0-6' bgs	0							No Split Spoons Collected Background HNu Reading Øppm
SP	6.Ø'-7.Ø' 2.5Y4/2 Dark Grayish Brown, Sand, Med., Poorly Sorted	6'–7'			50%		7 11 14 15	24ppm	Water Level at 7.0' bgs.
		8'–9'							No Split Spoons Collected
SW	10.Ø'-11.5' 2.5Y4/3 Olive Brown, Sand, Fine	10'–11'			90%		3 4 4 5	Øppm	
SP	11.5'-11.8' 10YR5/3 Brown, Sand, Course	12'							
		12'–13'							No Split Spoon Collected
SP	14.Ø-14.8' 2.5Y5/4 light Olive Brown, Sand, Med to Fine	14'–15'			90%		2 3 4 5	Øppm	
SP	14.8'-15.6' 2.5Y5/4 light Olive Brown, Sand, V. Course to granules with pebbles	15'–16'							
		16'							Bottom of Boring 16' bgs

SAIC

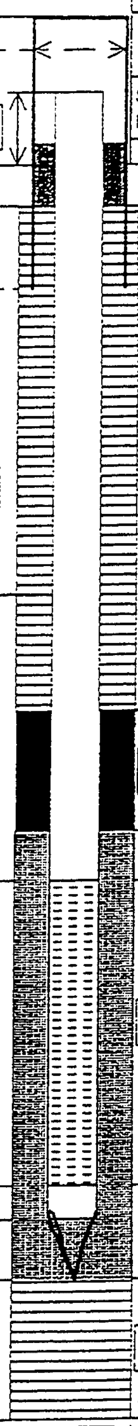
MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 10/94
Site ID: MW12-Ø2	Installation: Joe Foss Field		Site: MW12-Ø2
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company, Inc.	
Built by: Tracey Bugg		Driller: Lyle Porter	
Comp. Start: 7/15/95	Comp. End: 7/15/95	Well Coord.:	

PROTECTIVE COVER Flush Mount
Material Type: Diameter of Protective Casing [CASES]: Height:
Mortar Collar Height: Depth BGS: Drainage Hole ( ) Size:

GUARD POSTS
Yes / No No.: Configuration: Type:

SURFACE PAD
Material: Size:

RISER PIPE
Type: PVC Length [CASE]: Diameter [CASED]:



Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:

GROUT

Composition: Portland
Proportions:
Interval:
Method (See back):
1' Tremmied: YES NO Too Shallow

CASE No
CASED No

DEPTH (FEET)

SEAL (BSEAL)

2' Type: Econo plug - Medium Source:
Setup / Hydration time: 5 hours Vol. Fluid Added: 3 gal Tremied: YES NO

5.75 Ft

SCREEN (SCREN)

Type: PVC
Manufacturer: Campbell Monoflex
9.25' Diameter (ID): 4"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

GRAVEL FILTER (GFILT)

FILTER PACK
Type: Morie GA9
Amount Used: 7 1/4 bags
10' Gr. Size Dist.: for 010
Source
Tremmied: YES NO

15 Ft.
N/A Ft.
15.75 Ft.

BACKFILL PLUG (BFILL)

Material: Sand
.25' Setup / Hydration time: No
Method (See back): Tremied: YES NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 16 Ft

.85'
Borehole Dia.

SAIC

Field Boring Log

Site File No.	County Minnehaha	Boring No. MW12-03	Monitor Well No. MW12-03
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth
Fed ID No.		Auger Depth 16' bgs	Rotary Depth NA
State Planar Coordinates: N. E.		Date: Start 7/15/95 Time 1944	Finish 7/16/95 Time 1010
Borehole status (BSTAT)*:		Ground water Depth: NR	Method (See back):
Drilling Equipment: Acker Drill Rig, Hollow Stem Auger, 8" ID Hollow Stem Augers, 2" OD Split Spoon 140 lb Hammer		Surface (Circle one): Bare Grassy Wooded	

* Refer to back of page

Personnel:
G - Tracey Bugg
D - Lyle Porter
H - Mark LESLY
H -

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Core Not Logged 0-6' bgs	0–6'							Background HNu Reading Øppm Gravel; No Split Spoons Collected
		6'–8'							No Split Spoon Collected Too much backfill with gravel to collect a sample. Water level @ 8' bgs
		8'–10'							No Split Spoon Collected
SP	10.0'-10.8' 10YR 4/2 Dk. Grayish Brown, Sand, Course, Wet	10'–12'			40%		6 7 8 9	Øppm	Geotech Sample Collected
SP	10.8'-10.9 10YR 5/2 Grayish Brown, Sand, Medium								
		12'–14'							No Split Spoon Collected
SW	14.0'-14.5' 10YR 6/3 Pale Brown, Sand, Course, w/ quartzite pebbles, well rounded, well sorted	14'–16'			70%		9 9 10 4	Øppm	
SP	14.5'-15.0' 2.5Y 4/3 Olive Brown, Granules with Sand, poorly sorted								
SW	15.0'-15.4' 2.5Y 4/3 Olive Brown, Sand, Fine to Medium	16'							Bottom of Boring 16' bgs

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 10/94
Site ID: MW12 - Ø3	Installation: Joe Foss Field		Site: MW12 - Ø3
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company, Inc.	
Built by: Tracey Bugg		Driller: Lyle Porter	
Comp. Start: 7/15/95	Comp. End: 7/16/95	Well Coord.:	

PROTECTIVE COVER
Material Type: Flush Mount
Diameter of Protective Casing [CASES]:
Height:
Mortar Collar Height:
Depth BGS:
Drainage Hole ( )
Size:

Height:

CASES

GUARD POSTS
Yes (No) No.:
Configuration:
Type:

Casing Height:

STKUP flush

SURFACE PAD
Material:
Size:

RISER PIPE
Type: PVC
Length [CASE]:
Diameter [CASED]:

GS Elevation:
GS Height:
Depth BGS:

GROUT

Composition: Portland
Proportions:
Interval:
Method (See back):
1'
Tremmied: YES NO

CASE NO

CASED NO

DEPTH (FEET)

SEAL (BSEAL)

2'
Type: Econoplug - Medium
Source:
Setup / Hydration time: 24 hours
Vol. Fluid Added: 3 gal
Tremied: (YES) NO

5.75' Ft.

GRAVEL FILTER (GFILT)

FILTER PACK
Type: Morie GA9
Amount Used: 5 bags
10'
Gr. Size Dist.: for 010
Source
Tremmied: (YES) NO

SCREEN (SCREN)

Type: PVC
Manufacturer: Campbell Monoflex
9.25'
Diameter (ID): 4"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

15' Ft.

NA Ft.

15.75 Ft.

BACKFILL PLUG (BFILL)

Material: Sand
.25'
Setup / Hydration time:
Method (See back) :
Tremied: (YES) NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 16 Ft.

.85'
Borehole Dia.

SAIC

Field Boring Log

Site File No.	County Minnehaha	Boring No. MW12-04	Monitor Well No. MW12-04
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 16' bgs
Fed ID No.		Auger Depth 16' bgs	Rotary Depth NA
State Planar Coordinates: N.	E.	Date: Start 7/15/95 Time 1555	Finish 7/15/95 Time 1710
Borehole status (BSTAT)*:		Ground water Depth: 7.75' bgs	Method (See back):

Surface (Circle one): Bare Grassy Wooded

Drilling Equipment:
Acker Hollow Stem Auger Drill Rig
8" ID Hollow Stem Augers
2" OD Split Spoon 140 lb Hammer

* Refer to back of page

Personnel
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Core Not Logged 0-6' bgs	0							No Split Spoons Collected
SP	6.0-6.3' 10R 4/3 Weak Red, Sand, Med. Dry	6'			95%		14 20 16 14	0ppm	Wet at 7.75' bgs
SP	6.3'-7.8' 10YR 3/3 Dark Brown, Sand, Med. Wet	7'							
		8' - 9'							No Split Spoon Collected
SP	10.0'-10.8' 2.5Y 4/3 to 3/3 Olive Brown to Dark Olive Brown. Sand, med to course, some pebbles	10' - 11'			60%		4 10 11 12	0ppm	
SP	10.8'-11.2' SAME AS ABOVE EXCEPT 10YR 2/2 Very Dark Brown								
		12' - 13'							No Split Spoon Collected
SP	14.0'-14.2' 5Y 3/2 Dark Olive Gray. Sand, Fine to Med. with pebbles	14' - 15'			10%		4 7 8 9	0ppm	
		16'							Bottom of Boring 16' bgs

MONITORING WELL CONSTRUCTION LOG - Standard | Rev: 10/94

Site ID: MW12-04 | Installation: Joe Foss Field | Site: MW12-04

Project No.: 3423 | Client / Project: SDANG | Organization (Drilling Contractor): Layne-Western Company, Inc.

Built by: Tracey Bugg | Driller: Lyle Porter

Comp. Start: 7/15/95 | Comp. End: 7/15/95 | Well Coord.:

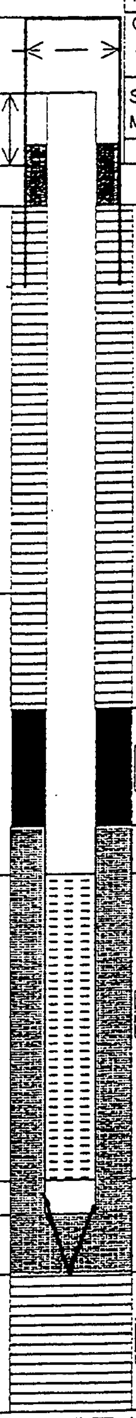
PROTECTIVE COVER Flush Mount
Material Type: | Diameter of Protective Casing [CASES]: | Height:
Mortar Collar Height: | Depth BGS: | Drainage Hole ( ) | Size:

GUARD POSTS
Yes / No | No.: | Configuration: | Type:

SURFACE PAD
Material: | Size:

RISER PIPE
Type: PVC | Length [CASE]: | Diameter [CASED]:

Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:



GROUT
Composition: Portland
Proportions:
Interval:
Method (See back):
1' | Tremmied: YES NO Too Shallow

CASE No

CASED No

DEPTH (FEET)

SEAL (BSEAL)
2' | Type: Econoplug - medium | Source:
Setup / Hydration time: 17.5 hours | Vol. Fluid Added: 3 gal | Tremied: YES NO

5.75 Ft

GRAVEL FILTER (GFILT)
10' | FILTER PACK
Type: Morie GA9
Amount Used: 6 bags
Gr. Size Dist.: for 010
Source
Tremmied: YES NO

SCREEN (SCREN)
9.25' | Type: PVC
Manufacturer: Campbell Monoflex
Diameter (ID): 4"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

15 Ft.

NA Ft.

15.75 Ft.

BACKFILL PLUG (BFILL)
.25' | Material: Sand
Setup / Hydration time:
Method (See back) : | Tremied: YES NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 16 Ft

.85'
Borehole Dia.

Field Boring Log

Site File No.	County Minnehaha	Boring No. MW12-05	Monitor Well No. MW12-05
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 16' bgs
Fed ID No.		Auger Depth 16' bgs	Rotary Depth NA
State Planar Coordinates: N.	E.	Date: Start 7/15/95 Time 1755	Finish 7/15/95 Time 1910

Borehole status (BSTAT)*:

Ground water Depth: Method (See back):

Surface (Circle one): Bare Grassy Wooded

Drilling Equipment:
Acker Hollow Stem Auger Drill Rig
8" ID Hollow Stem Augers
2" OD Split Spoon 140 lb Hammer

Personnel
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

*Refer to back of page

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Core Not Logged 0-6' bgs	0							No Split Spoons Collected Background HNu Reading Øppm
SP	6.Ø-6.25' 2.5Y 5/3 Lt. Olive Brown, Sand, Fine to Medium	6'			80%		5 5 6 7	Øppm	Water level at 6.6' bgs
OH	6.25'-6.5' 10YR 2/2 V. Dk. Brown, Silt, Very Plastic, Wet	7'							
SP	6.5'-7.5' 10YR 3/3 Dark Brown, Sand, medium	8'							No Split Spoon Collected
SP	1Ø.Ø'-1Ø.25' 2.5Y 3/3 Dark Olive Brown, Sand, medium	10'			60%		3 4 5 7	Øppm	
SP	1Ø.25'-1Ø.8' 10YR 2/2 V. Dk. Brown, Sand, Course to granules	11'							
SP	1Ø.8'-11.1' 2.5Y 3/2 V. Dk. Grayish Brown, Sand, Fine to Medium	12'							No Split Spoon Collected
SP	14.0'-14.5' 2.5Y 4/2 Dark Grayish Brown Sand, Medium	14'			90%		10 12 13 14	Øppm	
GP	14.5'-14.8' 2.5Y 3/2 V. Dk. Grayish Brown Pebbles with some granules	15'							
SP	14.8'-15.8' 2.5Y 5/2 Grayish Brown, Sand, Fine	16'							Bottom of Boring 16' bgs

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 10/94
Site ID: MW12-Ø5	Installation: Joe Foss Field		Site: MW12-Ø5
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company, Inc.	
Built by: Tracey Bugg		Driller: Lyle Porter	
Comp. Start: 7/15/95	Comp. End: 7/15/95	Well Coord.:	

PROTECTIVE COVER Flush Mount
Material Type: Diameter of Protective Casing [CASES]: Height:
Mortar Collar Height: Depth BGS: Drainage Hole ( ) Size:

GUARD POSTS
Yes / No (circled: No) No.: Configuration: Type:

SURFACE PAD
Material: Size:

RISER PIPE
Type: PVC Length [CASE]: Diameter [CASED]:

Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:
CASE
CASED
DEPTH (FEET)

GROUT
1'
Composition: Portland
Proportions:
Interval:
Method (See back):
Tremmied: YES NO Too Shallow

SEAL (BSEAL)
2'
Type: Econoplug Medium Source:
Setup / Hydration time: 18 hours Vol. Fluid Added: 3 gal Tremied: YES NO

5.75' Ft.

SCREEN (SCREN)
9.25'
Type: PVC
Manufacturer: Campbell Monoflex
Diameter (ID): 4"
Slot Size: .010
Schedule/Thickness: 40
Method (See back):

GRAVEL FILTER (GFILT)
10'
FILTER PACK
Type: Morie GA9
Amount Used: 6 1/4 bags
Gr. Size Dist.:
Source
Tremmied: YES NO

15 Ft.
NA Ft.
15.75' Ft.

BACKFILL PLUG (BFILL)
.25'
Material: Sand
Setup / Hydration time:
Method (See back): Tremied: YES NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 16 Ft.

.85'
Borehole Dia.

SAIC

Field Boring Log

Site File No.	County Minnehaha	Boring No. MW13-01	Monitor Well No. MW13-01
Site File Name SDANG Joe Foss Field		Surface Elev.	Completion Depth 20' bgs
Fed ID No.		Auger Depth 20' bgs	Rotary Depth NA
State Planar Coordinates: N. E.		Date: Start 7/13/95 Time 1410 Finish 7/13/95 Time 1845	
Borehole status (BSTAT)*:	Ground water Depth:	Method (See back):	
	Surface (Circle one):	Bare Grassy Wooded	

Drilling Equipment:
Acker Hollow Stem Auger Drill Rig
4" ID Hollow Stem Augers
2" OD Split Spoon 140 lb Hammer

Refer to back of page

Personnel
G - Tracey Bugg
D - Lyle Porter
H - Mark Lesly
H -

USCS	DESCRIPTION*	Depth in feet	MOIST*	Sample No.	Sample Recovery	Lab Anal Y/N	N Valves (Blows)	F.I.D. or P.I.D/ LEL Readings	REMARKS
	Asphalt 0-1.3'	0-1							No Split Spoons Collected Background HNu Reading 0 ppm
		1-4							
CH	4.0-4.9' 10YR 2/1 Black, Clay, High Plasticity, Dry	4-6			40%		4 4 6 6	0 ppm	
		6-8							No Split Spoon Collected
CH	8.0'-8.25' SAME AS ABOVE	8-10			50%		11 12 12 14	0 ppm	
CL	8.25'-8.6' 10YR 4/2 Dark Grayish Brown, Clay with Sand, Moist								
SC	8.6'-8.85' 10YR 3/3 Dark Brown, Sand, med, with Clay								
CL	8.85'-9.00' 10YR 2/1 Black, Clay, with Sand, med., Dry								
		10-12							Water Level at 11.4' bgs.
ML	10.0'-10.25' 10YR 3/3 Dark Brown, Silt, Wet	12-14							Shelby Tube Collected
SP	10.25'-10.75' 10YR 5/2 Grayish Brown, Sand, Med. with some pebbles								
GC	10.75'-11.0' 10YR 3/3 Dark Brown, Gravel with Pebbles								
		14-18							No Split Spoons Collected
SP	18'-18.5' 10YR 3/2 V. Dk. Grayish Brown, Sand, Fine grading to Med.	18-20			90%		5 7 7 6	0 ppm	
SW	18.5'-19.2' 10YR 3/2 V. Dk. Grayish Brown, Sand, Course grading to gravel, with Pebbles								
SP	19.2'-19.8' Sand, Course, Poorly Sorted	20							Bottom of Boring 20' bgs

MONITORING WELL CONSTRUCTION LOG - Standard			Rev: 10/94
Site ID: MW13-Ø1	Installation: Joe Foss Field		Site: MW13-Ø1
Project No.: 3423	Client / Project: SDANG	Organization (Drilling Contractor): Layne-Western Company Inc	
Built by: Tracey Bugg		Driller: Lyle Porter	
Comp. Start: 7/13/95	Comp. End: 7/13/95	Well Coord.:	

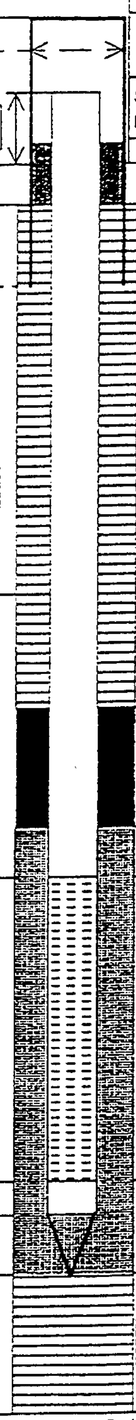
PROTECTIVE COVER Flush Mounts
Material Type: Diameter of Protective Casing [CASES]: Height:
Mortar Collar Height: Depth BGS: Drainage Hole ( ) Size:

GUARD POSTS
Yes / No No.: Configuration: Type:

SURFACE PAD
Material: Size:

RISER PIPE
Type: PVC Length [CASE]: Diameter [CASED]: 2"

Height:
CASES
Casing Height:
STKUP Flush
GS Elevation:
GS Height:
Depth BGS:



GROUT
Composition: Portland
Proportions:
Interval:
Method (See back):
2' Trenmied: YES NO

CASE No

CASED No

DEPTH (FEET)

SEAL (BSEAL)
2' Type: Peltonite Source:
Setup / Hydration time: Vol. Fluid Added: 3gal Tremied: YES NO

9' Ft

GRAVEL FILTER (GFILT)
FILTER PACK
Type: Morie GA9
Amount Used: 3½ (Possible Bridging)
Gr. Size Dist.:
Source
Tremmied: YES NO

SCREEN (SCREN)
Type: PVC
Manufacturer: Campbell Monoflex
Diameter (ID): 2"
Slot Size: 010
Schedule/Thickness: 40
Method (See back):

19 Ft.
Ft.
19.5 Ft.

BACKFILL PLUG (BFILL)
Material: Sand
Setup / Hydration time:
Method (See back): Tremied: YES NO

CENTRALIZERS( )
Type:
Depth(s):

TOTAL DEPTH (DPTOT) 20 Ft

.38'
Borehole Dia.

APPENDIX E. ANALYTICAL REPORTS

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Huntingdon

Huntingdon Engineering & Environmental, Inc.
601 East 48th Street North
Sioux Falls, South Dakota 57104-0698
(605) 332-5371
Fax: (605) 332-8488

REPORT OF: CHEMICAL ANALYSIS

PROJECT: SAIC

DATE: September 12, 1995

REPORTED TO: SAIC
PAT PATEL
1710 GOODRIDGE DRIVE
MCLEAN VA 22102

LABORATORY NO: 6610 95-170

Date Received: 8-30-95
Date Sampled: 8-29-95
Authorization: Job No. 01-0513-04-3423

The results of the BETX analysis are listed in Table 1. The results of the TPH analysis are listed in Table 2. The results of the solvents analysis will be reported under separate cover as they become available.

TABLE 1
VOLATILE ANALYSIS

Client Sample ID Parameter	FB05 0827950910 95-7154	FB06 0827950910 95-7155	EB06 0827950930 95-7156	TB06 082795 95-7157	MW1-13-02 Area 13 0827951030 95-7158	MW2-13-02 Area 13 0827951030 95-7159	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:							
α,α,α-Trifluorotoluene	96%	96%	92%	95%	95%	96%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 9-7, 9-8, 9-9-95
USEPA SW846 Method 8020

Huntingdon

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: September 12, 1995
PAGE: 2

TABLE 1 (cont.)
VOLATILE ANALYSIS

Client Sample ID / Parameter	MW1-12-02 Area 12 0827951320 95-7160	MW2-12-02 Area 12 0827951800 95-7161	MW3-12-02 Area 12 0827951640 95-7162	MW4-12-02 Area 12 0827951536 95-7163	MW5-12-02 Area 12 0827951420 95-7164	MW6-12-02 Area 12 0827951230 95-7165	MDL
Total Hydrocarbons as Gasoline	340	<7	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:							
α,α,α-Trifluorotoluene	97%	97%	97%	98%	94%	93%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 9-7, 9-8, 9-9-95
USEPA SW846 Method 8020

Technical Review: ________

LABORATORY QUALITY CONTROL

		ACCURACY DATA		PRECISION DATA
Parameter	Sample #	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
Benzene	95-7159	102%	101%	0.8%
Toluene	95-7159	102%	101%	0.8%
Xylene	95-7159	102%	100%	1.9%
Ethylbenzene	95-7159	102%	100%	2.5%

Huntingdon

Huntingdon Engineering & Environmental, Inc.
601 East 48th Street North
Sioux Falls, South Dakota 57104-0698
(605) 332-5371
Fax: (605) 332-8488

REPORT OF: CHEMICAL ANALYSIS

PROJECT: SAIC

DATE: September 8, 1995

REPORTED TO: SAIC
PAT PATEL
1710 GOODRIDGE DRIVE
MCLEAN VA 22102

LABORATORY NO: 6610 95-170

Date Received: 8-30-95
Date Sampled: 8-29-95
Authorization: Job No. 01-0513-04-3423

The results of the TPH analysis are listed in Table 1.

TABLE 1
TOTAL PETROLEUM
HYDROCARBONS ANALYSIS

Sample Identification	Client Sample ID	Total Petroleum Hydrocarbons (mg/L)	SURROGATE RECOVERY: Triacontane
95-7166	Area 13, MW1-13-02	<0.1	85%
95-7167	Area 13, MW2-13-02	<0.1	82%
95-7168	Area 12, MW1-12-02	0.30	74%
95-7169	Area 12, MW2-12-02	<0.1	92%
95-7170	Area 12, MW3-12-02	<0.1	80%
95-7171	Area 12, MW4-12-02	<0.1	95%
95-7172	Area 12, MW5-12-02	<0.1	78%
95-7173	Area 12, MW6-12-02	<0.1	76%
95-7174	MS01	<0.1	105%
95-7175	MS001	<0.1	89%
95-7176	TB06	<0.1	105%
PQL		0.1	

Samples were quantified as #2 fuel oil.
All values are in mg/L which is equivalent to parts per million (ppm).
PQL - Practical Quantitation Limit
Date Extracted: 8-31-95
Date Analyzed: 9-1-95
USGS/California Method

Huntingdon

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: September 12, 1995
PAGE: 3

TABLE 2
TOTAL PETROLEUM
HYDROCARBONS ANALYSIS

Sample Identification	Client Sample ID	Total Petroleum Hydrocarbons (mg/L)	SURROGATE RECOVERY: Triacontane
95-7154	FB05	<0.1	95%
95-7155	FB06	<0.1	99%
95-7156	EB06	<0.1	93%
PQL		0.1	

Samples were quantified as #2 fuel oil.
All values are in mg/L which is equivalent to parts per million (ppm).
PQL - Practical Quantitation Limit
Date Extracted: 8-31-95
Date Analyzed: 9-1-95
USGS/California Method

Technical Review: SVH

LABORATORY QUALITY CONTROL

	ACCURACY DATA		PRECISION DATA
Parameter	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
TPH	101%	104%	2.3%
Surrogate Recovery	104%	104%	---

HUNTINGDON ENGINEERING & ENVIRONMENTAL, INC.

Virginia VerMulm
Laboratory Supervisor

Dan T. Hanson /PS
Dan T. Hanson
Chemistry Manager

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: September 8, 1995
PAGE: 2

LABORATORY QUALITY CONTROL

		ACCURACY DATA	PRECISION DATA
Parameter	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
TPH	101%	104%	2.3%
Surrogate Recovery	104%	104%	---

HUNTINGDON ENGINEERING & ENVIRONMENTAL, INC.

Virginia VerMulm
Laboratory Supervisor

Dan T. Hanson
Dan T. Hanson
Chemistry Manager

Huntingdon

Huntingdon Engineering & Environmental, Inc.
601 East 48th Street North
Sioux Falls, South Dakota 57104-0698
(605) 332-5371
Fax: (605) 332-8488

REPORT OF: CHEMICAL ANALYSIS

PROJECT: SAIC **DATE:** August 14, 1995

REPORTED TO: SAIC
PAT PATEL
1710 GOODRIDGE DRIVE
MCLEAN VA 22102

LABORATORY NO: 6610 95-170

Date Received: 7-19-95
Date Sampled: 7-18-95
Authorization: Job No. 01-0513-04-3423

The results of the BETX analysis are listed in Table 1. The results of the TPH analysis are listed in Table 2. The results of the solvents analysis will be reported under separate cover as they become available.

TABLE 1
VOLATILE ANALYSIS

Client Sample ID / Parameter	TB05 0718950950 95-6150	FB03 0718950955 95-6151	FB04 0718951000 95-6152	MW1-13-01 Area 13 0718951110 95-6153	MW2-13-1 Area 13 0718951145 95-6154	EB05 0718951130 95-6155	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:							
α,α,α-Trifluorotoluene	112%	107%	106%	106%	104%	105%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 7-29, 7-31-95
USEPA SW846 Method 8020

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: August 14, 1995
PAGE: 2

TABLE 1 (cont.)
VOLATILE ANALYSIS

Client Sample ID / Parameter	MW2-12-1 0718951300 95-6156	MW6-12-1 0718951330 95-6157	MW3-12-01 0718951450 95-6158	MW4-12-01 0718951600 95-6159	MW5-12-01 0718951650 95-6160	MW1-12-01 0718951410 95-6161	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	<7	81	7
Benzene	<1	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:							
α,α,α-Trifluorotoluene	106%	107%	107%	104%	105%	108%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 7-29, 7-31-95
USEPA SW846 Method 8020

LABORATORY QUALITY CONTROL

		ACCURACY DATA		PRECISION DATA
Parameter	Sample #	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
Benzene	95-6154	105%	104%	0.8%
Toluene	95-6154	105%	104%	0.8%
Xylene	95-6154	105%	102%	3.2%
Ethylbenzene	95-6154	105%	101%	4.0%

VOLATILE:BTEX
LABORATORY CONTROL SAMPLE DATA
(Percent Recovery, %)

Parameter	7-29-95	7-31-95
Benzene	103	99
Toluene	103	100
Xylene	103	100
Ethylbenzene	103	100

VOLATILE:BETX
CONTINUING CALIBRATION DATA
(Percent Recovery, %)

Parameter	7-29-95	7-31-95
Benzene	101	103
Toluene	100	102
Xylene	100	103
Ethylbenzene	99	102

VOLATILE:BETX
METHOD BLANK DATA

7-29-95	7-31-95
<1	<1

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: August 14, 1995
PAGE: 4

TABLE 2
TOTAL PETROLEUM HYDROCARBONS ANALYSIS

Sample Identification	Client Sample ID	Total Petroleum Hydrocarbons (mg/L)	SURROGATE RECOVERY: Pentacosane
95-6150	TB05	<0.1	95%
95-6151	FB03	<0.1	94%
95-6152	FB04	<0.1	97%
95-6153	MW1-13-01	<0.1	76%
95-6154	MW2-13-1	<0.1	74%
95-6155	EB05	<0.1	96%
95-6156	MW2-12-1	<0.1	74%
95-6157	MW6-12-1	<0.1	84%
95-6158	MW3-12-01	<0.1	98%
95-6159	MW4-12-01	<0.1	81%
95-6160	MW5-12-01	<0.1	87%
95-6161	MW1-12-01	<0.1	73%
MDL		0.1	

Samples were quantified as #2 fuel oil.
All values are in mg/L which is equivalent to parts per million (ppm).
MDL - Method Detection Limit
Date Extracted: 7-25-95
Date Analyzed: 7-26-95
USGS/California Method

LABORATORY QUALITY CONTROL

		ACCURACY DATA	PRECISION DATA
Parameter	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
TPH	89%	107%	18%
Surrogate Recovery	99%	102%	---

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: August 14, 1995
PAGE: 5

TOTAL PETROLEUM HYDROCARBONS
LABORATORY CONTROL SAMPLE DATA

	7-26-95
Percent Recovery	90%

TOTAL PETROLEUM HYDROCARBONS
CONTINUING CALIBRATION DATA

	7-26-95
Percent Recovery CC1	104%
Percent Recovery CC2	110%
Percent Recovery CC3	86%

TOTAL PETROLEUM HYDROCARBONS
METHOD BLANK DATA

7-26-95
<0.1

HUNTINGDON ENGINEERING & ENVIRONMENTAL, INC.

Virginia VerMulm
Laboratory Supervisor

Dan T. Hanson
Dan T. Hanson
Chemistry Manager

Huntingdon

Huntingdon Engineering & Environmental, Inc.
601 East 48th Street North
Sioux Falls, South Dakota 57104-0698
(605) 332-5371
Fax (606) 332-8488

REPORT OF: CHEMICAL ANALYSIS

PROJECT: SAIC

DATE: July 6, 1995

REPORTED TO: SAIC
PAT PATEL
655 METRO PLACE S
SUITE 745
DABLIN OH 43017

LABORATORY NO: 6610 95-170

Date Received: 6-14-95
Date Sampled: 6-13-95
Authorization: Job No. 01-0513-04-3423

The results of the BETX analysis are listed in Table 1. The results of the TPH analysis are listed in Table 2.

TABLE 1
VOLATILE ANALYSIS

Client Sample ID / Parameter	GS01-1 Area 12 0613951115 95-5329	GS01-3 Area 12 0613951205 95-5330	GS02-1 Area 12 0613951425 95-5331	GS02-3 Area 12 0613951445 95-5332	GS03-1 Area 12 0613951520 95-5333	GS03-3 Area 12 0613951550 95-5334	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:							
α,α,α-Trifluorotoluene	92%	100%	95%	97%	91%	96%	

All values are in ug/kg. ug/kg is equal to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 6-14, 6-15, 6-16, 6-19, 6-21-95
USEPA SW846 Method 8020

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: July 6, 1995
PAGE: 2

TABLE 1 (cont.)
VOLATILE ANALYSIS

Client Sample ID / Parameter	GS04-1 Area 12 0613951717 95-5335	GS04-3 Area 12 0613951740 95-5336	GS05-2 Area 12 0613951830 95-5337	GS05-3 Area 12 0613951840 95-5338	GS06-2 Area 12 0613951915 95-5339	TB01 Area 12 0613950800 95-5340*	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	94**	10**	<7	7
Benzene	<1	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:							
α,α,α-Trifluorotoluene	94%	99%	96%	96%	97%	98%	

All values are in ug/kg. ug/kg is equal to parts per billion.
* All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 6-16, 6-21-95
USEPA SW846 Method 8020
** Higher boiling hydrocarbons present, nontypical of gasoline.

LABORATORY QUALITY CONTROL

Parameter	Sample #	ACCURACY DATA: Matrix Spike Percent Recovery	ACCURACY DATA: Matrix Spike Duplicate Percent Recovery	PRECISION DATA: Relative Percent Difference
Benzene	95-5334	93%	95%	2.2%
Toluene	95-5334	96%	99%	2.2%
Xylene	95-5334	92%	95%	3.0%
Ethylbenzene	95-5334	95%	97%	2.2%

LABORATORY QUALITY CONTROL

Parameter	Sample #	ACCURACY DATA: Matrix Spike Percent Recovery	ACCURACY DATA: Matrix Spike Duplicate Percent Recovery	PRECISION DATA: Relative Percent Difference
Benzene	95-5337	96%	98%	2.1%
Toluene	95-5337	98%	100%	2.1%
Xylene	95-5337	97%	98%	1.3%
Ethylbenzene	95-5337	100%	100%	0.0%

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: July 6, 1995
PAGE: 3

Date Received: 6-14-95
Date Sampled: 6-13-95
Authorization: Job No. 01-0513-04-3423

TABLE 1 (cont.)
VOLATILE ANALYSIS

Parameter	TB0-2 0613950800 95-5341	FB01 0613951340 95-5342	FB02 0613951345 95-5343	EB01 0613951040 95-5344	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	1
SURROGATE RECOVERY:					
α,α,α-Trifluorotoluene	97%	96%	86%	98%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 6-16, 6-19-95
USEPA SW846 Method 8020

LABORATORY QUALITY CONTROL

		ACCURACY DATA		PRECISION DATA
Parameter	Sample #	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
Benzene	95-5343	103%	106%	2.3%
Toluene	95-5343	104%	107%	2.4%
Xylene	95-5343	104%	106%	1.9%
Ethylbenzene	95-5343	103%	105%	1.6%

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: July 6, 1995
PAGE: 4

Date Received: 6-16-95
Date Sampled: 6-15-95
Authorization: Job No. 01-0513-04-3423

TABLE 1 (cont.)
VOLATILE ANALYSIS

Parameter	EB03 Area 12 0615951145 95-5395	EB04 Area 13 0615951300 95-5396	GW12-5 Area 12 0615951020 95-5397	GW12-6 Area 12 0615951020 95-5398	TB03 Areas 12& 13 0615951020 95-5399	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	70	<7	7
Benzene	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:						
α,α,α-Trifluorotoluene	98%	98%	100%	97%	99%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 6-16, 6-19, 6-20, 6-22, 6-23-95
USEPA SW846 Method 8020

LABORATORY QUALITY CONTROL

		ACCURACY DATA		PRECISION DATA
Parameter	Sample #	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
Benzene	95-5399	105%	105%	0.6%
Toluene	95-5399	105%	105%	1.2%
Xylene	95-5399	105%	105%	0.6%
Ethylbenzene	95-5399	105%	105%	0.6%

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: July 6, 1995
PAGE: 5

Date Received: 6-19-95
Date Sampled: 6-15-95
Authorization: Job No. 01-0513-04-3423

TABLE 1 (cont.)
VOLATILE ANALYSIS

Parameter	GS13-1-1 Area 13 0615951330 95-5480	GS13-1-4 Area 13 0615951410 95-5481	GS13-2-1 Area 13 0615951450 95-5482	GS13-2-4 Area 13 0615951540 95-5483	GS13-3-1 Area 13 0615951622 95-5484	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:						
α,α,α-Trifluorotoluene	98%	91%	94%	92%	93%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 6-16, 6-19, 6-20, 6-22, 6-23-95
USEPA SW846 Method 8020

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: July 6, 1995

TABLE 1 (cont.)
VOLATILE ANALYSIS

Parameter	GS13-3-4 Area 13 0613951720 95-5485	GS13-4-2 Area 13 0613951800 95-5486	GS13-4-4 Area 13 0613951820 95-5487	GS13-4-5 Area 13 0613951840 95-5488	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	1
SURROGATE RECOVERY:					
α,α,α-Trifluorotoluene	93%	91%	90%	95%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 6-16, 6-19, 6-20, 6-22, 6-23-95
USEPA SW846 Method 8020

LABORATORY QUALITY CONTROL

		ACCURACY DATA		PRECISION DATA
Parameter	Sample #	Matrix Spike Percent Recovery	Matrix Spike Duplicate Percent Recovery	Relative Percent Difference
Benzene	95-5481	100%	94%	6.5%
Toluene	95-5481	101%	94%	8.5%
Xylene	95-5481	100%	91%	8.8%
Ethylbenzene	95-5481	101%	93%	8.5%

REPORT OF: CHEMICAL ANALYSIS

LABORATORY NO. 6610 95-170

DATE: July 6, 1995
PAGE: 7

Date Received: 6-16-95
Date Sampled: 6-16-95
Authorization: Job No. 01-0513-04-3423

TABLE 1 (cont.)
VOLATILE ANALYSIS

Parameter	GW12-1 Area 12 0616950900 95-5438	GW12-2 Area 12 0616950955 95-5439	GW12-03 Area 12 0616951045 95-5440	TB04 Area 12 0616950900 95-5441	GW12-4 Area 12 0616951125 95-5442	MDL
Total Hydrocarbons as Gasoline	<7	<7	<7	<7	<7	7
Benzene	<1	<1	<1	<1	<1	1
Toluene	<1	<1	<1	<1	<1	1
Xylenes	<1	<1	<1	<1	<1	1
Ethylbenzene	<1	<1	<1	<1	<1	1
SURROGATE RECOVERY:						
α,α,α-Trifluorotoluene	97%	97%	99%	95%	96%	

All values are in ug/L. ug/L is equivalent to parts per billion.
MDL - Method Detection Limit
Date Analyzed: 6-19, 6-20-95
USEPA SW846 Method 8020

LABORATORY QUALITY CONTROL

Parameter	Sample #	ACCURACY DATA: Matrix Spike Percent Recovery	ACCURACY DATA: Matrix Spike Duplicate Percent Recovery	PRECISION DATA: Relative Percent Difference
Benzene	95-5343	103%	106%	2.3%
Toluene	95-5343	104%	107%	2.4%
Xylene	95-5343	104%	106%	1.9%
Ethylbenzene	95-5343	103%	105%	1.6%

Huntingdon

Huntingdon Engineering & Environmental, Inc.
1908 Innerbelt Business Center Drive
St. Louis, Missouri 63114-5700
Telephone: (314) 426-0880
Fax: (314) 426-4212

July 6, 1995

Ms. Virginia VerMulm
Maxim/Huntingdon Sioux Falls
601 E. 48th Street N.
Sioux Falls, South Dakota 57104-0698

Dear Ms. VerMulm:

On June 20, 1995, Huntingdon/St.Louis received two water samples and nine soil samples for Volatile Organic analysis. The samples received are:

St.Louis No.	Sioux Falls No.
95003032	95-5396;EB04
95003033	95-5399;TB03
95003034	95-5480;GS13-1-1
95003035	95-5481;GS13-1-4
95003036	95-5482;GS13-2-1
95003037	95-5483;GS13-2-4
95003038	95-5484;GS13-3-1
95003039	95-5485;GS13-3-4
95003040	95-5486;GS13-4-2
95003041	95-5487;GS13-4-4
95003042	95-5488;GS13-4-5

The samples were analyzed using the EPA OLMO1 statement of work. A CLP deliverable is provided. All calibrations, surrogates, internal standards, matrix spike/duplicates, method blanks and lab control samples met the required QC controls.

If you have any questions about this data package, please call me at (314) 426-0880.

Sincerely,

Marti Ward

Marti Ward
QA/QC Coordinator/Data Validation

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5396

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955396

Matrix: (soil/water) WATER Lab Sample ID: 95003032

Sample wt/vol: 5 (g/ml) ML Lab File ID: >E8666

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. Date Analyzed: 06/22/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	J
67-64-1	Acetone	8	J
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U

1A-2

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5396

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955396

Matrix: (soil/water) WATER   Lab Sample ID: 95003032

Sample wt/vol: 5 (g/ml) ML   Lab File ID: >E8666

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec.   Date Analyzed: 06/22/95

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/L	Q
1330-20-7	Xylene (total)	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

95-5396

Lab Name: TCT-ST.LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955396

Matrix: (soil/water) WATER Lab Sample ID: 95003032

Sample wt/vol: 5 (g/ml) ML Lab File ID: >E8666

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. Date Analyzed: 06/22/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 115071	1-Propene	1.41	6	JBN
2.				
3.				
4.				
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5399

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955396

Matrix: (soil/water) WATER   Lab Sample ID: 95003033

Sample wt/vol: 5 (g/ml) ML   Lab File ID: >E8667

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec.   Date Analyzed: 06/22/95

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U

1A-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5399

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955396

Matrix: (soil/water) WATER Lab Sample ID: 95003033

Sample wt/vol: 5 (g/ml) ML Lab File ID: >E8667

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. Date Analyzed: 06/22/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/L	Q
1330-20-7	Xylene (total)	10	U

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1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

95-5399

Lab Name: TCT-ST.LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955396

Matrix: (soil/water) WATER Lab Sample ID: 95003033

Sample wt/vol: 5 (g/ml) ML Lab File ID: >E8667

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. Date Analyzed: 06/22/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 115071	1-Propene	1.41	5	JBN
2.				
3.				
4.				
5.				
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5480

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955480

Matrix: (soil/water) SOIL   Lab Sample ID: 95003034

Sample wt/vol: 5 (g/ml) G   Lab File ID: >G3587

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec. 8   Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	11	U
67-64-1	Acetone	11	U
75-15-0	Carbon Disulfide	11	U
75-35-4	1,1-Dichloroethene	11	U
75-34-3	1,1-Dichloroethane	11	U
156-59-2	cis-1,2-Dichloroethene	11	U
156-60-5	trans-1,2-Dichloroethene	11	U
67-66-3	Chloroform	11	U
107-06-2	1,2-Dichloroethane	11	U
78-93-3	2-Butanone	11	U
71-55-6	1,1,1-Trichloroethane	11	U
56-23-5	Carbon Tetrachloride	11	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	11	U
78-87-5	1,2-Dichloropropane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
79-01-6	Trichloroethene	11	U
124-48-1	Dibromochloromethane	11	U
79-00-5	1,1,2-Trichloroethane	11	U
71-43-2	Benzene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
75-25-2	Bromoform	11	U
108-10-1	4-Methyl-2-pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
108-88-3	Toluene	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
100-42-5	Styrene	11	U

1A-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5480

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003034

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3587

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 8 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	11	U

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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5481

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003035

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3588

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 21 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	13	U
74-83-9	Bromomethane	13	U
75-01-4	Vinyl chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	13	U
67-64-1	Acetone	7	J
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-34-3	1,1-Dichloroethane	13	U
156-59-2	cis-1,2-Dichloroethene	13	U
156-60-5	trans-1,2-Dichloroethene	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	U
78-93-3	2-Butanone	13	U
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
108-05-4	Vinyl Acetate	13	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	13	U
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-pentanone	13	U
591-78-6	2-Hexanone	13	U
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U

1A-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5481

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955480

Matrix: (soil/water) SOIL   Lab Sample ID: 95003035

Sample wt/vol: 5 (g/ml) G   Lab File ID: >G3588

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec. 21   Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	13	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5482

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003036

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3589

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 6 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	11	U
67-64-1	Acetone	63	
75-15-0	Carbon Disulfide	11	U
75-35-4	1,1-Dichloroethene	11	U
75-34-3	1,1-Dichloroethane	11	U
156-59-2	cis-1,2-Dichloroethene	11	U
156-60-5	trans-1,2-Dichloroethene	11	U
67-66-3	Chloroform	11	U
107-06-2	1,2-Dichloroethane	11	U
78-93-3	2-Butanone	10	J
71-55-6	1,1,1-Trichloroethane	11	U
56-23-5	Carbon Tetrachloride	11	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	11	U
78-87-5	1,2-Dichloropropane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
79-01-6	Trichloroethene	11	U
124-48-1	Dibromochloromethane	11	U
79-00-5	1,1,2-Trichloroethane	11	U
71-43-2	Benzene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
75-25-2	Bromoform	11	U
108-10-1	4-Methyl-2-pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
108-88-3	Toluene	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
100-42-5	Styrene	11	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5482

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003036

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3589

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 6 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	11	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5483

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003037

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3590

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 16 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	2	J
67-64-1	Acetone	6	J
75-15-0	Carbon Disulfide	12	U
75-35-4	1,1-Dichloroethene	12	U
75-34-3	1,1-Dichloroethane	12	U
156-59-2	cis-1,2-Dichloroethene	12	U
156-60-5	trans-1,2-Dichloroethene	12	U
67-66-3	Chloroform	12	U
107-06-2	1,2-Dichloroethane	12	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	12	U
56-23-5	Carbon Tetrachloride	12	U
108-05-4	Vinyl Acetate	12	U
75-27-4	Bromodichloromethane	12	U
78-87-5	1,2-Dichloropropane	12	U
10061-01-5	cis-1,3-Dichloropropene	12	U
79-01-6	Trichloroethene	12	U
124-48-1	Dibromochloromethane	12	U
79-00-5	1,1,2-Trichloroethane	12	U
71-43-2	Benzene	12	U
10061-02-6	trans-1,3-Dichloropropene	12	U
75-25-2	Bromoform	12	U
108-10-1	4-Methyl-2-pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	12	U
79-34-5	1,1,2,2-Tetrachloroethane	12	U
108-88-3	Toluene	12	U
108-90-7	Chlorobenzene	12	U
100-41-4	Ethylbenzene	12	U
100-42-5	Styrene	12	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5483

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955480

Matrix: (soil/water) SOIL   Lab Sample ID: 95003037

Sample wt/vol: 5 (g/ml) G   Lab File ID: >G3590

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec. 16   Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	12	U

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EPA SAMPLE NO.

95-5484

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VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003038

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3600

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 6 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	11	U
74-83-9	Bromomethane	11	U
75-01-4	Vinyl chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	11	U
67-64-1	Acetone	11	J
75-15-0	Carbon Disulfide	11	U
75-35-4	1,1-Dichloroethene	11	U
75-34-3	1,1-Dichloroethane	11	U
156-59-2	cis-1,2-Dichloroethene	11	U
156-60-5	trans-1,2-Dichloroethene	11	U
67-66-3	Chloroform	11	U
107-06-2	1,2-Dichloroethane	11	U
78-93-3	2-Butanone	1	J
71-55-6	1,1,1-Trichloroethane	11	U
56-23-5	Carbon Tetrachloride	11	U
108-05-4	Vinyl Acetate	11	U
75-27-4	Bromodichloromethane	11	U
78-87-5	1,2-Dichloropropane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
79-01-6	Trichloroethene	11	U
124-48-1	Dibromochloromethane	11	U
79-00-5	1,1,2-Trichloroethane	11	U
71-43-2	Benzene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
75-25-2	Bromoform	11	U
108-10-1	4-Methyl-2-pentanone	11	U
591-78-6	2-Hexanone	11	U
127-18-4	Tetrachloroethene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
108-88-3	Toluene	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
100-42-5	Styrene	11	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5484

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955480

Matrix: (soil/water) SOIL   Lab Sample ID: 95003038

Sample wt/vol: 5 (g/ml) G   Lab File ID: >G3600

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec. 6   Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	11	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5485

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955480

Matrix: (soil/water) SOIL   Lab Sample ID: 95003039

Sample wt/vol: 5 (g/ml) G   Lab File ID: >G3592

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec. 18   Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	12	U
67-64-1	Acetone	15	
75-15-0	Carbon Disulfide	12	U
75-35-4	1,1-Dichloroethene	12	U
75-34-3	1,1-Dichloroethane	12	U
156-59-2	cis-1,2-Dichloroethene	12	U
156-60-5	trans-1,2-Dichloroethene	12	U
67-66-3	Chloroform	12	U
107-06-2	1,2-Dichloroethane	12	U
78-93-3	2-Butanone	12	U
71-55-6	1,1,1-Trichloroethane	12	U
56-23-5	Carbon Tetrachloride	12	U
108-05-4	Vinyl Acetate	12	U
75-27-4	Bromodichloromethane	12	U
78-87-5	1,2-Dichloropropane	12	U
10061-01-5	cis-1,3-Dichloropropene	12	U
79-01-6	Trichloroethene	12	U
124-48-1	Dibromochloromethane	12	U
79-00-5	1,1,2-Trichloroethane	12	U
71-43-2	Benzene	12	U
10061-02-6	trans-1,3-Dichloropropene	12	U
75-25-2	Bromoform	12	U
108-10-1	4-Methyl-2-pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	12	U
79-34-5	1,1,2,2-Tetrachloroethane	12	U
108-88-3	Toluene	12	U
108-90-7	Chlorobenzene	12	U
100-41-4	Ethylbenzene	12	U
100-42-5	Styrene	12	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5485

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003039

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3592

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 18 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	12	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5486

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003040

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3595

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 23 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	13	U
74-83-9	Bromomethane	13	U
75-01-4	Vinyl chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	13	U
67-64-1	Acetone	9	J
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-34-3	1,1-Dichloroethane	13	U
156-59-2	cis-1,2-Dichloroethene	13	U
156-60-5	trans-1,2-Dichloroethene	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	U
78-93-3	2-Butanone	13	U
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
108-05-4	Vinyl Acetate	13	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	13	U
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-pentanone	13	U
591-78-6	2-Hexanone	13	U
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5486

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955480

Matrix: (soil/water) SOIL   Lab Sample ID: 95003040

Sample wt/vol: 5 (g/ml) G   Lab File ID: >G3595

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec. 23   Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	4	J

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5487

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003041

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3596

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 21 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

CAS NO.	COMPOUND	ug/Kg	Q
74-87-3	Chloromethane	13	U
74-83-9	Bromomethane	13	U
75-01-4	Vinyl chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	2	J
67-64-1	Acetone	13	U
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-34-3	1,1-Dichloroethane	13	U
156-59-2	cis-1,2-Dichloroethene	13	U
156-60-5	trans-1,2-Dichloroethene	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	U
78-93-3	2-Butanone	13	U
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
108-05-4	Vinyl Acetate	13	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	13	U
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-pentanone	13	U
591-78-6	2-Hexanone	13	U
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5487

Lab Name: TCT-ST. LOUIS   Contract: 6610-95-170

Lab Code: TCT   Case No.:   SAS No.:   SDG No.: 955480

Matrix: (soil/water) SOIL   Lab Sample ID: 95003041

Sample wt/vol: 5 (g/ml) G   Lab File ID: >G3596

Level: (low/med) LOW   Date Received: 06/20/95

% Moisture: not dec. 21   Date Analyzed: 06/21/95

GC Column: DB624   ID: 0.53 (mm)   Dilution Factor: 1

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	3	J

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5488

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003042

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3597

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 22 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	13	U
74-83-9	Bromomethane	13	U
75-01-4	Vinyl chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	13	U
67-64-1	Acetone	120	
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-34-3	1,1-Dichloroethane	13	U
156-59-2	cis-1,2-Dichloroethene	13	U
156-60-5	trans-1,2-Dichloroethene	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	U
78-93-3	2-Butanone	18	
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
108-05-4	Vinyl Acetate	13	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	13	U
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-pentanone	13	U
591-78-6	2-Hexanone	13	U
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	2	J
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

95-5488

Lab Name: TCT-ST. LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003042

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3597

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 22 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	(ug/L or ug/Kg) ug/Kg	Q
1330-20-7	Xylene (total)	10	J

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VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

95-5488

Lab Name: TCT-ST.LOUIS Contract: 6610-95-170

Lab Code: TCT Case No.: SAS No.: SDG No.: 955480

Matrix: (soil/water) SOIL Lab Sample ID: 95003042

Sample wt/vol: 5 (g/ml) G Lab File ID: >G3597

Level: (low/med) LOW Date Received: 06/20/95

% Moisture: not dec. 22 Date Analyzed: 06/21/95

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	ETHYL-METHYL-BENZENE ISOMER	20.07	6	J
2.	Isomer of C9H12	21.09	11	J
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
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19.				
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21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

APPENDIX F. CHAIN OF CUSTODY FORMS

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SAIC Science Applications International Corporation
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Chain of Custody Record

Date 8-30-95 Page ____ of ____

Shipment No. 6

Name Tracy S. Bugg
Address 655 Metro Place S. Suite 745, Dublin, OH
Phone Number (614) 793-7600
Project Manager Pat Patel
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423
Sampler (Signature) (Printed Name) Tracy S. Bugg

Laboratory Name Huntingdon
Address 601 48th St
Sioux Falls, SD
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters: TPH-FO	No. of Containers	Observations, Comments, Special Instructions
7166	Water	MW1-13-02	8/29/95	1030	Area 13	X	2	
7167	↓	MW2-13-02	↓	1030	↓	X	2	
7168		MW1-12-02		1320	Area 12	X	2	
7169		MW2-12-02		1800	↓	X	2	
7170		MW3-12-02		1640		X	2	
7171		MW4-12-02		1536		X	2	
7172		MW5-12-02		1420		X	2	
7173		MW6-12-02		1230	↓	X	2	
7174		MS01		1800	—	X	2	
7175		MSD01		1800	—	X	2	
7176	↓	TB06	↓	—	—	X	2	Trip Blank

Total Number of Containers: 22
Shipment Method: Hand Delivered

Relinquished by	Date	Received by	Date
Signature: Tracy S. Bugg	8/30/95	Signature: J Meeker	8/30/95
Printed Name: Tracy S. Bugg	Time 0725	Printed Name: J Meeker	Time 8:15
Company: SAIC		Company: Mayim	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) 535-7438

White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

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Date 8-30-95 Page ____ of ____

Shipment No. 6

Name Tracy S. Bugg
Address 655 Metro Place S, Suite 745, Dublin, OH
Phone Number (614) 793-7600
Project Manager Pat Patel
Project Name SOANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423

Sampler (Signature) Tracy S. Bugg (Printed Name) Tracy S. Bugg

Laboratory Name Huntingdon
Address 601 45th St
Sioux Falls, SD
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	8-Solvents	TPH	No. of Containers	Observations, Comments, Special Instructions
7154	water	FB05	8/27/95	0910	—	X	X	X	8	
7155	↓	FB06	↓	0910	—	X	X	X	8	
7156	↓	EB06	↓	0930	—	X	X	X	8	
7157	↓	TB06	↓	—	—	X	X		6	
7158	↓	MW1-13-02	↓	1030	Area 13	X	X		6	
7159	↓	MW2-13-02	↓	1030	↓	X	X		6	
7160	↓	MW1-12-02	↓	1320	Area 12	X			3	
7161	↓	MW2-12-02	↓	1800	↓	X			3	
7162	↓	MW3-12-02	↓	1640	↓	X			3	
7163	↓	MW4-12-02	↓	1536	↓	X			3	
7164	↓	MW5-12-02	↓	1420	↓	X			3	
7165	↓	MW6-12-02	↓	1230	↓	X			3	

Relinquished by	Date / Time	Received by	Date / Time
Signature: Peter J. Ferron; Printed Name: Peter J. Ferron; Company: SAIC	Date: 8/30/95; Time: 0725	Signature: J. Meeker; Printed Name: J. Meeker; Company: Maxim	Date: 8/30/95; Time: 8:15
Signature: ; Printed Name: ; Company:	Date: ; Time:	Signature: ; Printed Name: ; Company:	Date: ; Time:

Total Number of Containers:

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method:

SAIC Location (circle)

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(703) 734-2500

Oak Ridge
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(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
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(206) 747-7899

San Diego
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(619) 535-7438

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Date 7-18-95 Page 2 of 2

Shipment No. 4

Name Peter J. Ferron
Address 655 Metro Place S, Suite 745 Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Pat Patel
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423

Sampler (Signature) Peter J Ferron (Printed Name) Peter J. Ferron

Laboratory Name Huntingdon
Address 601 48th St
Sioux Falls SD
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters: TPH	No. of Containers	Observations, Comments, Special Instructions
6150	Water	TB05	7/18/95	0950	—	X	2	Trip Blank
6151	↓	FB03		0955	—	X	2	Water Source
6152		~~FB03~~ FB04		1000	—	X	2	Water source
6153		MW1-13-01		1110	Area 13	X	2	
6154		MW2-13-1		1145	↓	X	2	
6155		EB05		1130	—	X	2	
6156		MW2-12-1		1300	Area 12	X	2	
6157		MW6-12-1		1330		X	2	
6158		MW3-12-01		1450		X	2	
6159		MW4-12-01		1600		X	2	
6160		MW5-12-01		1650		X	2	
6161		MW1-12-01		1410	↓	X	2	
	↓	Cooler Blank	↓		4°C		1	

Total Number of Containers: 25

Shipment Method: Hand Delivery

Relinquished by
Signature: Peter J Ferron
Printed Name: Peter J. Ferron
Company: SAIC
Date: 7/19/95
Time: 0830

Received by
Signature: Karleen Kurvink
Printed Name: Karleen Kurvink
Company: Huntingdon
Date: 7/19/95
Time: 8:30

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
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(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
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Seattle
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(619) 535-7438

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Date 7-18-95 Page 1 of 8

Shipment No. 4

Name Peter J. Ferron
Address 655 Metro Place S. Suite 745 Dublin OH 43017
Phone Number 614 793-7600
Project Manager Pat Patel
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423
Sampler (Signature) [signature] (Printed Name) Peter J. Ferron

Laboratory Name Huntingdon
Address 601-48th St
Sioux Falls SD
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	8-Solvents	No. of Containers	Observations, Comments, Special Instructions
6150	Water	TB05	7/18/95	0950	—	X	X	6	Trip Blanks
6151		FB03		0955		X	X	6	Water Source
6152		FB04		1000		X	X	6	Water Source
6153		MW1-13-01		1110	Area 13	X	X	6	
6154		MW2-13-1		1145		X	X	6	
6155		EB05		1130	—	X	X	6	
6156		MW2-12-1		1300	Area 12	X	~~X~~	6	
6157		MW6-12-1		1330		X	~~X~~	~~6~~ 3	
6158		MW3-12-01		1450		X	~~X~~	~~6~~ 3	
6159		MW4-12-01		1600		X		3	
6160		MW5-12-01		1650		X		3	
6161		MW1-12-01		1410		X		3	
		Cooler Blank			4°C			1	

Total Number of Containers: 55

Shipment Method: Hand Delivery

Relinquished by	Date	Received by	Date
Signature: [signature]	7/19/95	Signature: Karleen Kurvink	7/19/95
Printed Name: Peter J. Ferron	Time 0830	Printed Name: Karleen Kurvink	Time 8:30
Company: SAIC		Company: Huntingdon	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)
Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500
Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
Denver 1626 Cole Boulevard, Suite 270, Golden, CO 80401 (303) 231-9094
Seattle 13400B Northup Way, S38, Bellevue, WA 98005 (206) 747-7899
San Diego 4224 Campus Point, Building 3, San Diego, CA 92121 (619) 535-7438

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Date 6-14-95 Page 1 of 1

Shipment No. 01

Name Peter J. Ferrer
Address [illegible]
Phone Number (614) 793-7600
Project Manager [illegible]
Project Name JoeFoss Field SI
Job/P.O. No. 01-0513-04-3425

Sampler (Signature) Peter J. Ferrer (Printed Name) Peter J. Ferrer

Laboratory Name Huntingdon
Address Sioux Falls SD
Phone (605) 332-5371
Contact Name Mitch Kemmenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	TPH											NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	Soil	6501-1	6-13-95	1115	Area 12	X	X											3	
		6501-3		1805		X	X											3	
		6502-1		1425		X	X											3	
		6502-3		1445		X	X											3	
		6503-1		1520		X	X											3	
		6503-3		1550		X	X											3	
		6504-1		1717		X	X											3	
		6504-3		1740		X	X											3	
		6505-2		1930		X	X											3	
		6505-3		1940		X	X											3	
		6506-2		1915		X	X											3	
	Water	TB01		0800		X	~~X~~											3	Trip Blank

Relinquished by: Peter J. Ferrer (Signature) Peter J. Ferrer (Printed Name) SAIC (Company) Date 6/14/95 Time 10:00

Received by: (Signature) Virginia VanMulm (Printed Name) Huntingdon (Company) Date 6-14-95 Time 10:10

Relinquished by: Signature / Printed Name / Company Date Time

Received by: Signature / Printed Name / Company Date Time

Total Number of Containers: 36

Shipment Method: Hand Delivery

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C. 1710 Goodridge Dr., McLean, VA 22102 (703) 734-2500

Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031

Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100

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White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

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Date 6-14-95 Page 1 of 1

Shipment No. 01

Name Peter J. Ferron
Address 655 Metro Place S. Suite 745 Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Pat Patel
Project Name JoeFoss Field SI
Job/P.O. No. 01-0573-04-3423
Sampler (Signature) [illegible] (Printed Name) Peter J. Ferron

Laboratory Name Huntingdon
Address
Sioux Falls SD
Phone 605 332 5371
Contact Name Mitch Kannenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	Solvents	TPH											No. of Containers	Observations, Comments, Special Instructions
	Water	TB[illegible]	6-13-95	0800		X	X	~~X~~											3	
	↓	FB01	↓	1340		X	X	X											5	
		FB02		1345		X	X	X											5	
		EB01		1040		X		X											5	
	↓	EB02	↓	1040		X	~~X~~	X											5	
		CB02																		Temperature Blank

Relinquished by	Date	Received by	Date
Signature: [signature]	6/14/95	Signature: [signature]	6-14-95
Printed Name: Peter J. Ferron	Time: 1000	Printed Name: Virginia Ver[illegible]	Time: 1010
Company: SAIC		Company: Huntingdon	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers: 23

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Hand Delivery

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

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(303) 231-9094

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(206) 747-7899

San Diego
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(619) 535-7438

SAIC Science Applications International Corporation
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Date 6-15-95 Page 1 of 1

Shipment No. 02

Name Peter J. Ferron
Address 655 Metro Place S, Suite 745 Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Pat Patel
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423

Sampler (Signature) [signature] (Printed Name) Peter J. Ferron

Laboratory Name Huntingdon
Address 601 48th St
Sioux Falls SD
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters: TPH	No. of Containers	Observations, Comments, Special Instructions
	Water	EB03	6-15-95	1145	Area 12	X	2	
	↓	EB04	↓	1300	" 13	X	2	
	↓	GW12-5	↓	1020	" 12	X	2	
	↓	GW12-6	↓	1020	" 12	X	2	
	↓	CB-3	↓	—			1	Temperature Blank

Relinquished by	Date	Received by	Date
Signature: [signature]	6/16/95	Signature: [signature]	6/16/[illegible]
Printed Name: Peter J. Ferron	Time: 08:19	Printed Name: Cathy Purnell	Time:
Company: SAIC		Company: [illegible]	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Total Number of Containers: 9

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Hand Delivery

SAIC Location (circle)

Washington, D.C.
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(703) 734-2500

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San Diego
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White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

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Date 6-15-95 Page 1 of 2

Shipment No. 02

Name Peter J. Ferron
Address 655 Metro Place S. Suite 745 Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Paul Patel
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423

Sampler (Signature) [signature] (Printed Name) Peter J. Ferron

Laboratory Name Huntingdon
Address 601 48th St
Sioux Falls SD
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	Solvents	TPH	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
	Water	EB03	6-15-95	1145	Area 12	X			3	
		EB04		1300	13	X	X		6	
		GW12-5		1020	12	X			3	
		GW12-6		1020	12	X			3	
		TB03		1020	13B	X	X		6	
		CB-4							1	Temperature Blank
	Soil	GS13-1-1	6-15-95	1330	Area 13	X	X	X	5	
		GS13-1-2		1350					5	
		GS13-1-3		1400					5	
		GS13-1-4		1410					5	
		GS13-2-1		1450					5	
		GS13-2-2		1505					5	
		GS13-2-3		1515					5	

Relinquished by
Signature [signature]
Printed Name Peter J. Ferron
Company SAIC
Date 6/16/95
Time 0849

Received by
Signature [signature]
Printed Name [illegible]
Company Huntingdon
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 57

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Hand Delivery

SAIC Location (circle)
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Oak Ridge 800 Oak Ridge Tnpk., Oak Ridge, TN 37830 (615) 482-9031
Paramus One Sears Drive, Paramus, NJ 07652 (201) 599-0100
Denver 1626 Cole Boulevard, Suite 270, Golden, CO 80401 (303) 231-9094
Seattle 13400B Northup Way, S38, Bellevue, WA 98005 (206) 747-7899
San Diego 4224 Campus Point, Building 3, San Diego, CA 92121 (619) 535-7438

Science Applications International Corporation
White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

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Date 6-15-95 Page 2 of 2

Shipment No. 63

Name Peter J. Ferron
Address 655 Metro Place S. Suite 745 Dublin OH 43017
Phone Number (614)-793-7600
Project Manager Pat Patel
Project Name SOANG JoeFoss Field SI
Job/P.O. No. 01-0513-04-3123

Sampler (Signature) Peter J. Ferron (Printed Name) Peter J. Ferron

Laboratory Name Huntington
Address 661 48th St
Sioux Falls SD
Phone (605) 339-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	Solvents	TPH	No. of Containers	Observations, Comments, Special Instructions
	Soil	GS13-2-4	6-15-95	1540	Area 13	X	X	X	5	
		GS13-3-1		1620					5	
		GS13-3-2		1640					5	
		GS13-3-3		1700					5	
		GS13-3-4		1720					5	
		GS13-4-1		1750					5	
		GS13-4-2		1800					5	
		GS13-4-3		1810					5	
		GS13-4-4		1820					5	
		GS13-4-5		1840					5	

Relinquished by
Signature: Pete J. Ferron
Printed Name: Peter J. Ferron
Company: SAIC
Date: 6/16/95
Time: 0840

Received by
Signature: [illegible]
Printed Name: Sally Turnell
Company: [illegible]
Date: [illegible]
Time:

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 50

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Hand Delivery

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) 535-7438

Science Applications International Corporation

White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

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Date 6-16-95 Page 1 of 1

Shipment No. 03

Name Peter J. Ferron
Address 655 Metro Place S. Suite 745 Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Pat Patel
Project Name SDANG JoeFoss Field SI
Job/P.O. No. 01-0513-04-3423
Sampler (Signature) (Printed Name)

Laboratory Name Huntingdon
Address 601 East 48th Street N Sioux Falls, SD 57104-0618
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	TPH	[illegible]	No. of Containers	Observations, Comments, Special Instructions
	Water	GW-01	6-16-95	0900	Area 13	X	X		5	
		GW-02		0955		X	X		5	
		GW-03		1045		X	X		5	
		TB04		0900		X			3	
		CB5		—		—	—	X	1	Temperature Blank
		GW-11		1125		X	X		5	

Total Number of Containers: 24

Shipment Method: Hand Delivery

Relinquished by
Signature [signature]
Printed Name Peter J. Ferron
Company SAIC
Date 6/16/95
Time 1420

Received by
Signature [signature]
Printed Name
Company
Date [illegible]
Time [illegible]

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Instructions
1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

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1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
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(201) 599-0100

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(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) 535-7438

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Date 7-18-95 Page 1 of 8

Shipment No. 4

Name Peter J. Ferron
Address 655 Metro Place S, Suite 745 Dublin OH 43017
Phone Number 614 793-7600
Project Manager Pat Patel
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423

Sampler (Signature) [signature] (Printed Name) Peter J. Ferron

Laboratory Name Huntingdon
Address 601 N 8th St
Sioux Falls SD
Phone (605) 332-5371
Contact Name Mitch Kennenburg

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	BTEX	8-Solvents	No. of Containers	Observations, Comments, Special Instructions
	Water	TB05	7/18/95	0950	—	X	X	6	Trip Blanks
		FB03		0955	—	X	X	6	Water Source
		FB04		1000	—	X	X	6	Water Source
		MW1-13-01		1110	Area 13	X	X	6	
		MW2-13-1		1145	↓	X	X	6	
		EB05		1130	—	X	X	6	
		MW2-12-1		1300	Area 12	X	~~X~~	~~6~~ 3	
		MW6-12-1		1330		X	~~X~~	~~6~~ 3	
		MW3-12-01		1450		X	~~X~~	3	
		MW4-12-01		1600		X		3	
		MW5-12-01		1650		X		3	
		MW1-12-01	↓	1410	↓	X		3	
	↓	Water Blank						1	

Total Number of Containers: 59

Shipment Method: Hand Delivery

Relinquished by	Date	Received by	Date
Signature: [signature]	7/19/95	Signature: [signature]	
Printed Name: Peter J. Ferron	Time 0830	Printed Name: [illegible]	Time
Company: SAIC		Company: Huntingdon	

Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

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(619) 535-7438

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Date 7-18-95 Page 2 of 2

Shipment No. 4

Name Peter J. Ferron
Address 655 Metro Place S, Suite 745 Dublin OH 43017
Phone Number (614) 793-7600
Project Manager Pat Patel
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3423

Sampler (Signature) Peter J. Ferron (Printed Name) Peter J. Ferron

Laboratory Name Huntingdon
Address 601 40th St
Sioux Falls SD
Phone 605) 332-5371
Contact Name Mitch Kennenburg

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters: TPH	No. of Containers	Observations, Comments, Special Instructions
	Water	TB05	7/18/95	0950	—	X	2	Trip Blank
		FB03		0955	—	X	2	Water Source
		FB04		1000	—	X	2	Water Source
		MW1-13-01		1110	Area 13	X	2	
		MW2-13-1		1145		X	2	
		EB05		1130	—	X	2	
		MW2-12-1		1300	Area 12	X	2	
		MW6-12-1		1330		X	2	
		MW3-12-01		1450		X	2	
		MW4-12-01		1600		X	2	
		MW5-12-01		1650		X	2	
		MW1-12-01		1410		X	2	
		Cooler Blank					1	

Total Number of Containers: 25

Shipment Method: Hand Delivery

Relinquished by	Date	Received by	Date
Signature: Peter J. Ferron	7/19/95	Signature: Kathleen Kuiwirk	7/19
Printed Name: Peter J. Ferron	Time: 0830	Printed Name: Kathleen Kuiwirk	Time: [illegible]
Company: SAIC		Company: Huntingdon	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
1710 Goodridge Dr., McLean, VA 22102
(703) 734-2500

Oak Ridge
800 Oak Ridge Tnpk., Oak Ridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

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(303) 231-9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) 535-7438

White: ... Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

Chain of Custody Record

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Date 7-19-95 Page 1 of 1

Shipment No. 5

Name Peter J. Ferron
Address 655 Metro Place S. Suite 745 Dublin OH
Phone Number (614) 793-7600
Project Manager Pat Peter
Project Name SDANG Joe Foss Field SI
Job/P.O. No. 01-0513-04-3403

Sampler (Signature) Peter J. Ferron (Printed Name) Peter J. Ferron

Requested Parameters: Geotechnical

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Geotechnical	No. of Containers	Observations, Comments, Special Instructions
	Soil	MW13-01	7/13/95	1700	12-14'	X	1	Shelby Tube
		MW12-01	7/14/95	1715	14-16'	X	1	Ziplock Bags
		MW12-02	7/15/95	720	6-8'	X	1	
		MW12-03		2010	10-12'	X	1	
		MW12-04		1600	6-8'	X	1	
		MW12-05		1805	6-8'	X	1	

Laboratory Name Huntingdon
Address 601 48th St
Sioux Falls SD
Phone (605) 332 5371
Contact Name Mitch Kennenburg

Relinquished by
Signature: Peter J. Ferron
Printed Name: Peter J. Ferron
Company: SAIC
Date 7/19/95
Time 08/30

Received by
Signature: Kathleen Kunrick
Printed Name: Kathleen Kunrick
Company: Huntingdon
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 6

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Shipment Method: Hand delivery

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White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

APPENDIX G. SI DATA REQUIREMENTS FOR FEDERAL FACILITY DOCKET SITES

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SI DATA REQUIREMENTS FOR FEDERAL FACILITY DOCKET SITES

1. Supply copies of all sampling data, onsite and offsite, including location map, detection limits, raw data sheets, quality assurance/quality control (QA/QC) documents, date(s) sampled, analytical method(s) used, well or boring logs, and sampling technique(s).

2. Locate and identify on a map all known or suspected sources. Supply all information about source(s), such as: dates of operations, use, or spillage; amounts of material deposited, stores, or spilled; dimensions of source(s); known or suspected hazardous substances.

3. Provide a description of all aquifers beneath the site, including description of overlying materials, depth first encountered, thickness, and composition.

4. Provide the location of all drinking water wells within a 4-mile radius from the site (property boundary) and locate the wells within a 1-mile radius on a 7.5-minute topographic map. Provide information on depth of well(s), screening interval(s), depth of aquifer(s) encountered, population served for multiple wells (i.e., municipal system), provide the number of wells, average annual pumpage of each well, and total population served by system. Include information on all standby wells.

5. Provide information and location (on a 7.5-minute topographic map) of wells within 4 miles that are used to irrigate five or more acres of commercial food or forage crops, or watering of commercial livestock, or ingredient in commercial food preparation, or supply for aquaculture, or supply for a major or designated water recreation area, excluding drinking water use.

6. Provide average number of persons per residence for county (or counties) that the site is located in per the U.S. Census Bureau.

7. Identify and locate all surface water bodies within 2 miles of the site marking off the drainage routed (shown on a 7.5-minute topographic map) from each source to applicable surface water bodies. Provide the average annual cubic feet per second flow for each surface water body within 15 miles downriver or radius from the point of probable entry into surface water. For lakes, provide information on inflow and outflow.

8. Provide the number of acres in each drainage basin.

9. Provide the 2-year, 24-hour rainfall.

10. Provide the location of all drinking water intakes within 15 downstream miles (rivers) or 15-mile radius (lakes, bays, etc.). Provide information on population served. For multiple intakes (i.e., municipal system), provide information on the number of intakes, location of all intakes (regardless of 15-mile limit), and total population served by system. Include information on all standby intakes.

11. Provide information and location of intakes within 15 miles downriver (radius in lake or bay) that are used to irrigate five or more acres of commercial food or forage crops, or watering of commercial livestock, or ingredient in commercial food preparation, or supply for aquaculture, or supply for a major or designated water recreation area, excluding drinking water use.

12. Provide any surface water body 15 miles downriver (radius in lakes or bay) used for drinking water.

13. Provide the average human food chain production (pounds per year) for each surface water body 15 miles downriver of 15-mile radius in lake.

14. Within a 4-mile radius from the site and 15 miles downriver, or radius in lake, identify all sensitive environments that exist. Provide original documentation (U.S. Fish and Wildlife Service [USFWS], Natural Heritage Database, state agencies, National Oceanographic and Atmospheric Administration [NOAA], etc.), multiple sensitive environments within a sensitive environment.

15. What is the linear frontage of all wetlands 15 miles downriver or 15-mile radius in lake?

16. Provide the location and number of persons residing, working, attending school, or day care within 200 feet.

17. Identify all terrestrial sensitive environments that exist onsite. Provide original documentation (USFWS) Natural Heritage Database, state agencies, NOAA, etc.) and locate each on a 7.5-minute topographic map. Note that there could be multiple sensitive environments within a sensitive environment.

18. Provide the total number of people in the following distance rings from source(s)?

- 0 - 1/4 mile
- 1/4 - 1/2 mile
- 1/2 - 1 mile
- 1 - 2 miles
- 2 - 3 miles
- 3 - 4 miles.

Use 1990 Census data and/or actual house counts. Document how calculated.

19. Provide the location and area (in acres) of all wetlands within 4 miles of the site.

20. Contact U.S. Environmental Protection Agency (EPA) Regional Office immediately if any radionuclides are present or suspected at the site and supply all radiological information known to date.

21. For all of the above information, use primary data source and supply two copies or specify where copies may be obtained.

22. Provide any removals or remedial actions taken place at the site.

23. If information relevant to a question already has been provided to EPA, your answer may precisely cite the previous submittal by title, date, page, and paragraph number rather than resubmitting the information.

APPENDIX H. INVESTIGATION DERIVED WASTE MANAGEMENT

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July 11, 1995

Captain Alvin Punt, SDANG
114 FG/EM
1201 W Algonquin St.
PO Box 5044
Sioux Falls, SD 57117-5044

FACSIMILE

Dear Capt. Punt:

On July 10, 1995, I received a letter from you requesting an approval for a special discharge. You requested permission to discharge approximately 2000 gallons of water produced in the development of four new monitoring wells at your site. In a phone conversation you stated that you did not expect water to be contaminated except possibly very low levels of hydrocarbons.

I have reviewed your request along with the localized groundwater monitoring results that you submitted. I hereby give a temporary conditional approval to discharge the well development water into the City's sanitary sewer. Discharge is approved upon meeting the following conditions:

1. Wastewater volume shall not exceed 2,500 gallons;
2. Wastewater must be placed in a receptacle for monitoring before discharge;
3. Required Monitoring:
   Visual Inspection - must not have a visual sheen
   Monitor headspace above water in receptacle - < 5 % LEL
4. Wastewater must be discharged at manhole designated in your request;
5. Discharge is approved between July 12 and July 19, 1995;
6. This is a one time conditional approval specific to your request.

If you have any questions or comments on this matter, please contact my office 339-7088.

Sincerely,

RJ Kappel

Robert J. Kappel
Environmental Compliance Manager

c: Larry Mutchler, Pretreatment Coordinator

Utility Office	Water Purification	Water Reclamation	Lights	Maint./Svc. Division
224 West Ninth Street	2100 N. Minnesota Ave.	4500 N. Sycamore Ave.	2000 N. Minnesota Ave.	668 Algonquin Avenue
Sioux Falls, SD 57102	Sioux Falls, SD 57104	Sioux Falls, SD 57104	Sioux Falls, SD 57104	Sioux Falls, SD 57104
(605) 339-7031	(605) 339-7025	(605) 339-7088	(605) 339-7150	(605) 339-7020
FAX (605) 338-8490	FAX (605) 338-7801	FAX (605) 338-8484	FAX (605) 339-7006	FAX (605) 338-7883

APPENDIX I. DATA QUALITY ASSESSMENT

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APPENDIX I. DATA QUALITY ASSESSMENT

I.1 INTRODUCTION

A comprehensive quality assurance/quality control (QA/QC) program was followed during the Site Inspection (SI) conducted for Site 12 - Ramp Area and Site 13 - Motor Vehicle Maintenance Facility (MVMF) at the South Dakota Air National Guard (SDANG), Joe Foss Field located in Sioux Falls, South Dakota, to ensure that analytical results and the decisions based on these results are representative of the environmental condition at the sites. The objectives of the SI were to investigate the presence or absence of environmental contamination, and collect and analyze sufficient numbers of samples to support recommendations for further investigation or corrective actions. The following documents were utilized during the evaluation of the QC data: the U.S. Environmental Protection Agency (EPA) Level III; QC requirements contained within the guidelines and specifications presented in the Quality Assurance Project Plan (QAPP) (May 1995) submitted as part of the project plans prepared by Science Applications International Corporation (SAIC); the EPA Contract Laboratory Program (CLP) *Statement of Work for Organics Analysis*; and the EPA *Laboratory Data Validation Functional Guidelines for Evaluating Organics* (1988). The number of soil and groundwater samples collected during the SI, in addition to the numbers of field QC samples collected and selected laboratory QC samples (i.e., matrix spikes/matrix spike duplicates [MS/MSDs]) analyzed, are presented in Tables I-1a and I-1b. The data validation worksheets are referenced within the subsection describing the applicable analysis. The QC checks and results are summarized below.

I.1.1 Data Quality Objectives

A comparison of the SI analytical results to project data quality objectives (DQOs) as defined in the QAPP formed the basis for evaluating the quality of the analytical data. As described in the QAPP, analytical data must be of a known and acceptable quality in order to be used to evaluate contamination at MVMF. DQOs are qualitative and quantitative indicators of data quality. DQOs were established during the initial scoping process to guide the implementation of the field sampling and laboratory analyses for the SI. A QA program was established to standardize procedures and document activities. The program provided a means to detect and correct any deficiencies in the process. DQOs are set to define and establish the

criteria against the fitness of the data. Both quantitative and qualitative DQOs were established for the SI. Data verification and validation of 100 percent of the resulting analytical data packages ensured that Maxim Technologies, Inc. (MT) produced an acceptable quality level for results. Field activities affecting precision and accuracy were controlled by strict adherence to approved standard operating procedures (SOPs) and documentation of the field tasks. Field logbooks noted exceptions to the procedures and chain-of-custody records tracked sample shipments and receipt of these shipments by MT. These results confirmed that no cross-contamination due to sample handling practices or inadequate equipment decontamination occurred. Sampling precision was estimated by the analysis of field duplicate samples. Indicators used to assess both field and laboratory data quality include precision, accuracy, representativeness, comparability, and completeness (PARCC). The following sections summarize the DQOs for the PARCC parameters obtained during the SI.

I.1.1.1 Precision

Precision is a measure of the closeness with which multiple analyses of a given sample agree with each other. It can be defined as the agreement between the numerical values of two or more measurements that have been under identical conditions. Precision can thus be seen as a measure of the magnitude of errors. The overall precision of the measurement data is a mixture of sampling and analytical factors. Analytical precision can be measured through the analysis of MS/MSDs, and sampling precision and spatial variability of contamination can be assessed through the analysis of the field duplicates. Precision is stated in terms of standard deviation, coefficient of variation, range, and relative percent difference (RPD). The RPD between results of duplicate samples for a given compound or element traditionally has been used to assess precision between two samples. The RPD is defined as the ratio of the absolute value of the difference between two results and the mean of the results. RPD was calculated using the following equation:

$$\frac{|C_1 - C_2|}{\left(\frac{C_1 + C_2}{2}\right)} x\ 100$$

where:

C_1 = Concentration of the compound or element in the sample

C_2 = Concentration of the compound or element in the duplicate/replicate.

When the RPD approaches zero, complete agreement is achieved between duplicate sample pairs, indicating a high degree of precision.

The RPDs of the MS/MSD samples is the first type of QC sample used to assess the precision of the data quality. The laboratory selected 1 sample in 20 and split the sample into 3 sample portions. MS/MSD samples were prepared by routinely analyzing the first portion for the parameters of interest, while the remaining two portions were spiked with known quantities of the parameters of interest before analysis. The RPD between the spike results was calculated and used as an indication of the analytical precision for the solvents; benzene, toluene, ethylbenzene, and xylenes (BTEX), total petroleum hydrocarbons (TPH) as gasoline; and TPH as extractables.

All RPD values calculated from the solvents (7 values reviewed), BTEX and TPH as gasoline (12 reviewed values), and TPH as extractables (2 reviewed values) soil MS/MSD analyses were within the methods control limits. Since each analysis was evaluated according to the required QC criteria described in Section I.3 and all of these criteria were met for the environmental samples analyzed, these RPD values are considered to be a more representative reflection of the variability characteristic of the environmental condition at MVMF, and as a result, the analytical DQO for solvents, BTEX, and TPH precision is considered to have been met. Overall, the analytical precision DQO for those analyses is considered to have been met. The analytical QC criteria used to evaluate analytical precision and all MS/MSD results are discussed in Section I.3.

The second type of QC sample, field duplicate samples, was included as part of the SI. Field duplicate samples assess the precision of the sampling techniques and spatial variability of the contamination. Field duplicates were collected using the same techniques as those used to collect the environmental samples. Field duplicates were collected at a rate of 1 duplicate per

10 field samples per matrix for each parameter. No corrective action was taken based on RPD results. Field RPD values were calculated only for compounds detected in concentrations greater than the contract required quantitation limits (CRQLs) and method detection limits (MDLs) in both replicate pair samples or in one sample. No specific control limits for field precision were established in part because the natural heterogeneity of the environmental media was much greater than the variability imparted by field activities.

No solvents, BTEX, and TPH as extractables were detected in soil and groundwater field duplicates. TPH as gasoline was detected in one soil field duplicate (i.e., GS6-2) and one groundwater field duplicate (i.e., GW12-6) collected from Site 12. RPD values were 200 percent for TPH as gasoline. These are attributable to TPH as gasoline concentrations being near the MDL in the field samples.

Overall, project precision for environmental analyses has been determined to be adequate for the uses of the analytical data, which were to identify the contaminants and provide an assessment of the distribution of each compound in both soil and water matrices. Section I.2 presents a comprehensive discussion of all field duplicate sample results.

I.1.1.2 Accuracy

Accuracy is the closeness of agreement between an observed result and the true value for a sample analysis. Accuracy can be evaluated for a particular method by measuring the agreement between an observed result from analysis of a reference standard with an analytical lot and its certified value. Accuracy is usually expressed in terms of bias (high or low). Bias is assessed by the percent recovery of a compound or element that has been added to the QC sample or environmental sample prior to analysis. Sampling accuracy is assessed by evaluating the results of the trip blanks, field blanks, and equipment blanks; analytical accuracy is assessed through the use of MS/MSDs. Analytical accuracy is expressed as the percent recovery of a

compound or element that has been added to the environmental sample at a known concentration before analysis. The percent recovery values were calculated using the following equation:

$$\frac{S_s - S_o}{S_a} x\ 100$$

where:

S_s = Total compound or element concentration detected in the spiked sample

S_o = Concentration of the compound or element detected in the unspiked sample

S_a = Concentration of the compound or element added to the sample.

Analytical accuracy for this project was measured through the use of surrogate field samples and MS/MSD samples. Each type of spike provided different information on the accuracy of the measurement system.

The percent recoveries of the surrogates for solvents, BTEX, TPH as gasoline, and TPH as extractables analyses were the first type of QC used to assess the accuracy of the data quality. Surrogate compounds spiked into field samples provide information on the efficiency of all steps of the gas chromatography/mass spectrometry (GC/MS) and GC methods in recovering these compounds from the individual sample matrices. In the EPA analytical program, surrogate recoveries are used to determine if an analytical method is in control and to obtain information on recovery effects in the environmental matrix. The QC limits for recovery of all surrogates for soil and water environmental samples for solvents were those established for the EPA CLP. The QC limits for recovery of all surrogates for soil and water environmental samples for BTEX and TPH extractables were those established by the laboratory for SW Method 8020 and Hazardous Materials Laboratory, California Department of Health Services (CAL DHS) method. All surrogate percent recoveries were within the applicable control limits. All supporting volatile organic compound (VOC) and TPH information cited above also was qualitatively evaluated with respect to the analytical accuracy DQO.

The percent recoveries of the MS/MSD for solvents, BTEX, TPH as gasoline, and TPH as extractables analyses was the second type of QC used to assess the accuracy of the data quality. Accuracy determined by MS/MSD samples is a function of both matrix and method. All VOC MS/MSD percent recoveries were within the control limits. Recovery values of two out of four reviewed TPH as extractables MS/MSD results were above the 125 percent limit. Above upper limit recoveries in the natural matrix spikes indicate possible interferences and possible high bias data. Despite these values, no systematic laboratory error was detected; however, the results are considered to have little impact on the overall environmental data quality. All supporting metals QC information cited above also was qualitatively evaluated with respect to the analytical accuracy DQO. Based on the evaluation of the MS/MSD results and the associated laboratory QC results summarized in Section I.3 on a project-wide basis, the laboratory accuracy has been determined to be acceptable for all analyses, and as such, the analytical DQO for accuracy was met, except where noted.

Sampling accuracy was maximized by the adherence to the strict QA program presented in the SI QAPP. All procedures (i.e., soil boring and groundwater sample collection); equipment decontamination; and health monitoring equipment calibration and operation) used during the SI were documented in the QAPP. Field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) were prepared to ensure that all samples represent the particular site from which they were collected, assess any cross-contamination that may have occurred, and qualify the associated analytical data accordingly.

During the sampling program, approximately 14 percent of the samples collected during the program were field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) obtained to determine the degree of cross-contamination or ensure successful decontamination procedures. Based on an evaluation of the compounds detected in the field QC blanks, the overall field accuracy is acceptable. As a result, the field DQO for accuracy is considered to have been met. A comprehensive discussion of the field QC results is presented in Section I.2.

I.1.1.3 Representativeness

Representativeness is defined as the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling location, a process condition, or an environmental condition. Representativeness is the qualitative parameter concerned most with the proper design of the sampling program. The selected sampling methods ensure that an environmental sample accurately represents the characteristic population from which it was obtained. Although considerable information was available regarding the historical activities conducted at the SI sites, potential contaminant source areas within the sites were not well-defined at all of the sites. Soil samples were collected from areas suspected of having the highest potential for contamination and to obtain areal coverage of the sites. Factors that affect the representativeness of the analytical data include improper preservation, holding times, use of standard analytical methods, and matrix or analyte interferences. Holding times and preservation criteria are based on the most restrictive holding times recommended by EPA for water and soil matrices. Sample representativeness was ensured during the SI by collecting sufficient samples of a population medium, properly distributed with respect to location and time. Representativeness was assessed by reviewing the drilling techniques and equipment, sample collection methods, equipment, and sample containers used during the SI, in addition to evaluating the RPD values calculated from the duplicate samples. The reproducibility of a representative set of samples reflects the degree of heterogeneity of the sampled medium, as well as the effectiveness of the sample collection techniques. Intervals for soil sampling were chosen to obtain the strata with the highest concentrations of contaminants in order to achieve the most conservative representation and to optimize the number of samples required.

Based on the evaluation of the factors described above and summarized in Section I.3, the samples collected during the SI are considered to be representative of the environmental condition at SDANG.

I.1.1.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another and is limited to the other PARCC parameters, because only when precision and accuracy are known can one data set be compared to another. Quantitative

criteria for determining if representativeness has been achieved are not specifically stated. To optimize comparability, only the specific methods and protocols that were specified in the QAPP were used to collect and analyze samples during the SI at MVMF. By using consistent sampling and analysis procedures, all data sets were comparable within the sites at SDANG, between sites at the installation, or among U.S. Army facilities nationwide, to ensure that remedial action decisions and priorities were based on a consistent data base. Comparability also was ensured by the analysis of EPA reference materials, establishing that the analytical procedures used were generating valid data. The SI utilized one laboratory to perform the analyses and the same sampling method for each medium. All samples collected for VOCs (i.e., solvents) were analyzed using the EPA CLP statement of work (SOW), BTEX and TPH as gasoline were analyzed using EPA solid waste methods. TPH as extractables was analyzed using CAL DHS method. Based on the precision and accuracy assessment presented above, the data collected during the SI are considered to be comparable with the data collected during previous investigations.

I.1.1.5 Completeness

Completeness is defined as the percentage of valid data obtained from the sampling and analysis process. For data to be considered valid, they must have met all acceptance criteria, including accuracy and precision, as well as any other criteria specified by the analytical methods used.

Furthermore, project completeness is defined as the percentage of data used to prepare a preliminary human health-based risk evaluation and upon which recommendations for site remediation are based. For analytical data to be considered usable for the preliminary risk evaluation and remediation recommendations, each data point must be satisfactorily validated. Results that have been flagged for various reasons may be considered to have encountered minor problems with limited impact on the data quality. The completeness of both laboratory analyses and sampling will be evaluated for each site. DQOs for the SI at MVMF were set at 95 percent for both the field sampling and laboratory completeness.

Site 12—Based on an evaluation of the laboratory QC, 100 percent of the BTEX and TPH data points were used as a basis for evaluating the magnitude and extent of contamination. Field completeness for soil and groundwater samples was 100 percent. Eleven soil boring samples and 14 groundwater samples were planned and actually collected from Site 12.

Site 13—The laboratory completeness for BTEX, solvents, and TPH analyses was 100 percent. Based on the evaluation of the field sampling, field completeness was 100 percent for Site 13. Nine soil borings samples and eight groundwater samples were scheduled and actually collected at Site 13.

I.2 FIELD QUALITY CONTROL ASSESSMENT

During all phases of the SI sampling program, QC samples were collected to gauge the impacts from various components of field activities. Approximately 18 percent of the samples collected during the program were QC samples obtained to determine the degree of cross-contamination, ensure successful decontamination procedures, or determine the effects of media heterogeneity on results. Six trip blanks, six field blanks, five equipment blanks, and five field duplicates (i.e., two soil and three groundwater) were collected and analyzed for the same compounds and using the same laboratory techniques as those used to analyze the environmental samples. Trip blanks, field blanks, and equipment blanks provide a measure of various sources of cross-contamination, decontamination efficiency, and any other potential error that can be introduced from sources other than the sample. Table I-2 contains a cross-reference of environmental samples to the associated field QC blank sample.

I.2.1 Trip Blanks

Trip blanks were collected to determine if cross-contamination of VOCs occurred during sample handling or shipment of environmental samples to the laboratory. Trip blanks were prepared by MT, located in Sioux Falls, South Dakota. Each trip blank consisted of two volatile organic analysis (VOA) vials per shipping cooler. These blanks were prepared with organic-free reagent water, sent to SDANG, stored with the unused sample bottles, and returned to the laboratory with each cooler containing environmental samples to be analyzed for VOCs (i.e., solvents and BTEX). Trip blanks were analyzed by EPA CLP OLMO1 SOW (solvents)

and SW8020 (BTEX). Table I-3 summarizes the concentrations of the detected solvents and VOCs in the trip blanks collected during the SI.

Solvents Analyses—Four trip blanks were collected and analyzed for solvents using EPA CLP OLMO1 SOW. Analytical results show that 1,1,1-trichloroethane was detected in one trip blank (i.e., TB02) at a concentration below the CRQL. The presence of 1,1,1-trichloroethane is not considered to be representative of environmental conditions at SDANG, since this solvent was not detected in the associated environmental samples.

BTEX Analyses—Six trip blanks were collected and analyzed for BTEX using EPA SW Method 8020. Analytical results show that BTEX were not detected in any trip blank.

I.2.2 Field Blanks

Field blanks were collected to provide baseline analytical data for the water used for equipment decontamination (i.e., American Society for Testing and Materials [ASTM] Type II reagent water) and in the steamcleaner equipment (i.e., potable water). Field blanks were collected by randomly selecting sample containers from the supply, filling them with the appropriate water source, and than preserving and analyzed these blanks for the same compounds and using the same laboratory methods as those used for the associated environmental samples. Table I-4 summarizes the concentrations of the detected compounds in the field blanks collected during the SI.

Solvents Analyses—Six field blanks were collected and analyzed for solvents using EPA CLP OLMO1 SOW. No unacceptable level of contamination was detected in the field blanks. Contamination was limited to two compounds: 1,1,1-trichloroethane and chloroform. 1,1,1-Trichloroethane (i.e., 2 μg/L) was detected in one field blank. Chloroform was detected in four field blanks, with a minimum concentration of 2 μg/L and a maximum of 34 μg/L. Since these solvents have not been detected in the associated environmental samples, no data validation flags were applied.

BTEX and TPH as Gasoline Analyses—Six field blanks were collected and analyzed for BTEX and TPH as gasoline using EPA SW Method 8020. Analytical results show that BTEX and TPH as gasoline were not detected in any field blank.

TPH as Extractables Analyses—Six field blanks were collected and analyzed for BTEX and TPH as extractables using CAL DHS. Analytical results show that TPH as extractables was not detected in any field blank.

I.2.3 Equipment Blanks

Equipment blanks provide a measure of the cumulative contamination derived from field sampling equipment, sample transit, storage, and analysis. Equipment blanks were prepared for manual and small automated sampling equipment used to collect environmental samples. One equipment blank was collected every day for each medium sampled by pouring ASTM Type II water into, through, or over a clean piece of sampling equipment and then dispensing the water into prepared sample bottles. Equipment blanks were shipped to the laboratory to be analyzed using the methods required for the environmental samples collected on the same day. All analytical data were reviewed for potential bias introduced from equipment blanks. Table I-5 summarizes the concentrations of the compounds detected in the equipment blanks collected during the SI. The following subsections summarize the compounds and elements detected in these blanks and the impact of any interference on the environmental data quality.

Solvents Analyses—Three equipment blanks were collected and analyzed by MT for solvents using EPA CLP OLMO1. No unacceptable level of contamination was detected in the equipment blanks. Chloroform was detected in two equipment blanks (i.e., 28 and 29 μg/L). Since this solvent has not been detected in the associated environmental samples, no data validation flag was applied.

BTEX and TPH as Gasoline Analyses—Five equipment blanks were collected and analyzed by MT for BTEX and TPH as gasoline using SW Method 8020. Analytical results show that BTEX and TPH as gasoline were not detected in any equipment blank.

TPH as Extractables Analysis—Five equipment blanks were collected and analyzed by MT for TPH as extractables using CAL DHS. No TPH was detected in the equipment blanks.

I.2.4 Field Duplicates

One duplicate environmental sample was collected for every 10 environmental samples, as required by the QAPP. Duplicate sample pairs were collected to ascertain the contribution of variability (i.e., precision) due to environmental media. Twenty soil and two duplicate samples, in addition to six groundwater and one duplicate sample, were collected. One field duplicate soil sample was collected after each 10 environmental samples, as indicated on the chain-of-custody forms. As required by the QAPP, soil samples were collected at specific intervals in the borehole. Specific samples to be sent to the laboratory were selected based on location in the borehole (e.g., at the water table) and health monitoring equipment (i.e., organic vapor analyzer [OVA]). Therefore, duplicate sample selection was less straightforward using these sample selection criteria than simply replicating 1 sample for every 10 collected, since samples were selected only after the drilling had been completed or the monitoring well had been screened. After the split-spoon was retrieved from the borehole, the samples to be screened for VOCs were immediately collected in the sample container. All soil samples to be analyzed by MT were collected using split-spoons equipped with 3-inch brass or stainless-steel sleeves. After the split-spoon sampler was retrieved from the borehole, VOC and TPH sleeves were capped and labeled, and each sample was then shipped to the laboratory in the liner. Therefore, the duplicate concentrations measured by the laboratory reflect the natural matrix variability inherent in the subsurface soils at Site 13 and were not used to assess sample collection precision. As required by the QAPP, water samples were collected to minimize loss of VOCs. The first bailer volume was used to fill the original and replicate sample vials. The next bailer volume was used to fill the bottles for the remaining parameters.

Field RPD values were calculated for compounds and elements detected in concentrations greater than the CRQL or MDL in both replicate pair samples or in one sample. Tables I-6 and I-7 summarize the concentrations of the compounds detected in the soil and groundwater replicate pair collected during the SI.

Solvents Analyses—Nine soil samples and four groundwater samples were collected during the SI and analyzed for solvents by EPA OLMO1 SOW. Two soil samples and two groundwater samples were collected in duplicate. RPD values were not calculated for compounds not detected in both the sample and duplicate sample.

No solvents were detected in the soil and groundwater field duplicates. Precision for solvents collection field duplicates analyses have been determined to be adequate for the SI.

BTEX and TPH as Gasoline Analyses—Twenty soil samples and 22 groundwater samples were collected during the SI and analyzed for BTEX and TPH as gasoline using SW Method 8020. Two soil and three water samples were collected in duplicate. RPD values were not calculated for compounds not detected in both the sample and duplicate samples. TPH as gasoline was detected in one soil field duplicate (i.e., GS6-2) and one groundwater field duplicate (i.e., GW12-6) collected from Site 12. RPD values were 200 percent for TPH as gasoline. These values are attributable to TPH as gasoline concentrations being near the MDL in the field samples. These RPD values include both fluctuations in the sampling and analytical variability.

TPH as Extractables Analyses—Twenty soil samples and 22 groundwater samples were collected during the SI and analyzed for TPH as extractables using CAL DHS. Two soil samples and three groundwater samples were collected in duplicate. RPD values were not calculated for compounds not detected in both the sample and duplicate sample.

No TPH as extractables were detected in the soil and groundwater field duplicates. Precision for solvents collection field duplicates analyses have been determined to be adequate for the SI.

I.3 LABORATORY QUALITY CONTROL ASSESSMENT

All environmental (i.e., soil and groundwater) samples and field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) collected during the SI at MVMF were analyzed using EPA methods from the following references:

- *Test Methods For Evaluating Solid Waste, Physical/Chemical Methods*, SW846 (BTEX and TPH)
- *Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, EPA Contract Laboratory Program, OLMO1 August 1991* (solvents).
- *Hazardous Materials Laboratory, California Department of Health Services*, February 1988 (TPH as extractables).

During the review and evaluation process, 100 percent of the analytical data generated using EPA methods were subject to a systematic and rigorous technical process by examining all analytical QC results and laboratory documentation, following the appropriate guidelines for laboratory data validation. The purpose of this section is to provide an assessment of the QA/QC results from the SI to confirm that the data used in this report meet the DQOs established for this investigation. Both quantitative measures and qualitative assessments will be presented to characterize these data as having sufficient quality to satisfy these objectives. The primary intent of this assessment is to illustrate that data originating from the SI can withstand scientific scrutiny and are technically defensible, and are of a known and acceptable precision and accuracy. All data were validated using the guidelines and specifications described in the following document:

- *Laboratory Data Validation Functional Guidelines Evaluating Organics Analyses*, EPA CLP, February 1988.

I.3.1 Organic Analyses

Environmental (i.e., soil and groundwater) samples and field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) collected during the SI were submitted to MT for solvents, BTEX, TPH as gasoline, and TPH as extractables analyses. A data quality assessment is presented in the following subsections.

I.3.1.1 Solvents Analyses (EPA OLMO1 SOW)

Nine soil samples, 4 groundwater samples, and 13 field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) were collected and analyzed by MT for solvents (i.e., vinyl chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, 1,2-dichloroethane, tetrachloroethane, and carbon tetrachloride) using EPA OLMO1 SOW. Data quality was evaluated using the guidelines and control limits specified for holding times, tuning and mass calibration results, initial and continuing calibration verification, method blanks, system monitoring compounds recoveries, internal standard areas, and MS/MSD results. The VOC data validation worksheets are presented in Table I-8.

Holding Times—Holding times are used to ascertain the validity of results based on the holding time of the sample from the time of collection to the time of analysis. MT was required by the QAPP and analytical methods to meet holding times of 7 days for unpreserved water samples, 14 days for preserved (i.e., sufficient hydrochloric acid to lower the pH to 2) water samples, and 14 days for soil samples collected for solvents analysis.

Analysis of samples that have exceeded the method-recommended holding times may result in the following: 1) concentrations of compounds that would have been detected ordinarily are undetected due to chemical transformation, compound volatilization, or biodegradation; 2) reported concentrations lower than those originally present due to the factors previously stated; or 3) reported concentrations greater than those originally present in the sample due to external contamination of water samples or changes in soil moisture content. Based on an evaluation of all environmental samples and field QC blanks analyzed for solvents, all holding time criteria were met.

Tuning and Mass Calibration Results—The first step in the calibration of the GC/MS system is to ensure correct mass calibration, mass resolution, and mass transmission. This was accomplished, in addition to a sensitivity check, using p-bromofluorobenzene (p-BFB) injected at a 50 ng concentration, as required by the SOW protocol. This standard was analyzed every 12 hours to ensure that the GC/MS was tuned correctly. Based on an evaluation of the

ionization and fragmentation criteria, in addition to the instrument tune frequency, all p-BFB tuning and mass calibration criteria requirements were met.

Initial Calibration Results—Compliance requirements for satisfactory instrument calibration have been established to ensure that the instrument is capable of producing acceptable quantitative data. Calibration of each GC/MS used to analyze the samples collected during the SI were established and validated by injecting standards at five concentrations, spanning the expected sample concentration range. Initial calibration was conducted after the GC/MS tune criteria were met and before any samples were analyzed to determine the instrument sensitivity and the linearity of each compound. The linearity is important to ensure reasonable quantitative results over the range of the curve. Following initial calibration, all compounds were evaluated to verify the validity of the calibration. Specifically, the relative response factors (RRFs) and percent relative standard deviation (%RSDs) for all solvents were evaluated to verify the validity of the initial calibration. Calibration criteria requirements (i.e., greater than 0.050 and less than 30 percent for RRFs and %RPDs, respectively) for solvents were presented in the Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses. All criteria requirements were met.

Continuing Calibration Verification Results—A check of the calibration curve was conducted before and after environmental samples were analyzed each day. The first daily standard in the BFB tuning period was used for quantitation of all sample analyses performed during the 12-hour period. The continuing calibration verification (CCV) was used for quantitation and to verify that the working curve is still valid. The CCV standard of the GC/MS system is evaluated based on the magnitude of the RRFs and percent difference (%D) between the average RRF of each compound for the initial calibration and the RRF of that compound in the CCV standard. CCV criteria requirements (i.e., greater than 0.050 and within ±25 percent for RRFs and %Ds, respectively) for solvents were presented in the Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses. Based on an evaluation of the CCVs conducted for solvents analyses, all criteria requirements were met.

Internal Standard Summaries—Three internal standards (ISs) (i.e., bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d_5) were added to all calibration standards, environmental samples, and QC blanks immediately before analysis as indicators of instrumental operating variations. The concentration of solvents detected in each sample was calculated with reference to the response factor (RF) of the appropriate IS for that compound. Internal standard area requirements are described in the EPA OLMO1 SOW. Based on an evaluation of all analyses, all internal areas were within the control limits.

System Monitoring Compounds Recoveries—Three deuterated compounds (i.e., 1,2-dichloroethane-d_4 toluene-d_8, and p-BFB) were added to each calibration standard, environmental sample, and laboratory and field QC sample immediately before analysis. Surrogate compounds spiked into field samples provide information on the efficiency of all steps of the GC/MS method in recovering these compounds from the individual environmental sample matrices. Since surrogate recoveries were spiked into every environmental sample, they were the primary tool used to determine if matrix interferences were present during solvent analyses. The QC limits for recovery of all surrogates for soil and water samples were those established for the EPA CLP SOW. All surrogate percent recoveries were within the applicable control limits for environmental samples. Tables I-9 and I-10 summarize the surrogate recovery results for the soil and water samples that were evaluated, respectively.

Method Blank Results—One method blank analysis was conducted for each analytical lot of environmental samples analyzed for solvents. Each method blank was evaluated for contaminants that prevent accurate quantitation of a target compound. If any problems with any blank existed, all data associated with the case were carefully evaluated to determine whether an inherent variability in the data for the case exists, or if the problem is an isolated occurrence that would not affect the data. Based on an evaluation of all method blanks analyzed for solvents using EPA OLMO1 SOW, no solvents were detected at a level and frequency that might bias the analytical results, except for chloroform. This solvent was noted in the method blank (i.e., VBLK3500) analyzed on July 25, 1995. No validation flag was applied, since this solvent was not detected in the associated environmental samples.

Matrix Spike/Matrix Spike Duplicate Results—MS/MSD analyses were conducted to assess the accuracy and precision of the laboratory and to evaluate the matrix effect of the sample upon the analytical methodology based upon the percent recovery of each compound. Accuracy was expressed as the percent recovery of the spike compounds. Precision was expressed as the RPD of the concentrations of the spike compounds in the MS/MSD samples. The control limits for percent recoveries in soil and water samples are described in the QAPP. MS/MSDs were evaluated to verify that one MS/MSD analysis was conducted for every 20 environmental sample received by the laboratory, that these analyses were conducted on environmental samples only, and that the recovery and difference results did not indicate systematic laboratory control problems. Table I-11 summarizes the MS/MSD results for soil samples.

All recovery and RPDs reviewed values for soil solvents MS/MSDs were within the EPA CLP advisory control limits. No MS/MSD analyses were conducted for groundwater samples collected during the SI.

I.3.1.2 BTEX and TPH as Gasoline Analyses (EPA Method 8020)

Twenty-two soil samples, 14 groundwater samples and 9 field QC blanks (i.e., trip blanks, field blanks, and equipment blanks) were collected and analyzed by MT for BTEX and TPH as gasoline using EPA Method 8020. Data quality was evaluated using the guidelines and control limits specified for holding times, initial and continuing calibrations, method blanks, surrogate internal standards, surrogate recoveries, and MS/MSD results. The BTEX and TPH as gasoline data validation worksheets are presented in Table I-12.

Holding Times—The objective is to ascertain the validity of results based on the holding time of the sample from the time of collection to the time of analysis. MT was required by the QAPP and analytical method to meet holding times of 14 days for soil and water samples. Based on an evaluation of all environmental samples and field QC blanks analyzed for BTEX and TPH as gasoline using EPA SW846 Method 8020, all holding time criteria were met.

Initial Calibration Results—Compliance requirements for satisfactory instrument calibration have been established to ensure that the instrument is capable of producing acceptable quantitative data. Calibration of each GC used to analyze the samples collected during the SI were established and validated by injecting standards at eight concentrations, spanning the expected sample concentration range. One of the standard concentrations was at a concentration near, but above, the method detection limit. Initial calibration was conducted before any samples were analyzed to determine the instrument sensitivity and the linearity of each compound. Following initial calibration, all compounds were evaluated to verify the validity of the calibration. Specifically, the response factors were calculated for BTEX and the results were used to establish the calibration curves. These calibration curves were used for BTEX, TPH as gasoline, and surrogate quantitation. All initial calibration criteria were met.

Continuing Calibration Standard Results—A check of the calibration curve was conducted before and after environmental samples were analyzed each day. The continuing calibration standard (CCS) was used to verify that the working curve is still valid. The CCS of the GC system was evaluated based on the magnitude of the instrument response for BTEX. The instrument response for BTEX and TPH as gasoline from the CCS must agree within ± 15 percent with the predicted response, and all preceding standard in an analysis sequence should fall within the daily retention time window established by the first standard of the sequence. Based on an evaluation of the CCSs conducted for BTEX and TPH as gasoline analyses, all criteria were met.

Surrogate Recoveries—One surrogate (i.e., α,α,α-trifluorotoluene) was added to each calibration standard, environmental sample, and laboratory and field QC sample immediately before analysis. Surrogate compounds spiked into field samples provide information on the efficiency of all steps of the GC method in recovering this compound from the individual environmental sample matrices. Since α,α,α-trifluorotoluene was spiked into every environmental sample, it was the primary tool used to determine if matrix interference was present during BTEX and TPH as gasoline analyses. The QC limits for recovery of α,α,α-trifluorotoluene in soil and water samples were submitted by MT for each analytical run (i.e., lower control limit and upper control limit). All surrogate recoveries were within the

recommended control limits. Tables I-13 and I-14 summarize the surrogate recovery results for soil and water samples, respectively.

Method Blank Results—One method blank analysis was conducted for each analytical lot of environmental samples analyzed for BTEX and TPH as gasoline. Each method blank was evaluated for contaminants that prevent accurate quantitation of a target compound. Based on an evaluation of all method blanks analyzed for BTEX and TPH as gasoline using EPA Method 8020, no BTEX and TPH as gasoline were detected in the method blanks.

Matrix Spike/Matrix Spike Duplicate Results—MS/MSD analyses were conducted to assess the accuracy and precision of the laboratory and to evaluate the matrix effect of the sample upon the analytical methodology based upon the percent recovery of each compound. Accuracy was expressed as the percent recovery of the spike compound. Precision was expressed as the RPD of the concentration of the spike compound in the MS/MSD samples. The control limits for percent recoveries in soil and water samples were described in the QAPP. MS/MSDs were evaluated to verify that one MS/MSD analysis was conducted for each 20 environmental samples received by the laboratory, that these analyses were conducted on environmental samples only, and that the recovery and difference results did not indicate systematic laboratory control problems. Table I-15 and I-16 summarize the MS/MSD results for soil and groundwater samples, respectively.

Five MS/MSD analyses were validated for soil samples collected during the SI. All MS/MSD recovery and RPD values were within control limits. Two MS/MSD analyses were conducted using groundwater samples collected during the SI. All MS/MSD and RPD values were within the control limits.

I.3.1.3 TPH as Extractables Analyses (CAL DHS)

Twenty soil samples, 22 groundwater samples, and 11 field QC blanks were collected during the SI and analyzed for TPH using CAL DHS. Data quality was evaluated using the guidelines and control limits specified for holding times, instrument calibration, method blanks,

surrogate recovery results, MS/MSDs, and laboratory control sample. The data validation worksheets are presented in Table I-17.

Holding Times—MT was required to meet an extraction holding time of 7 days for soil samples and water samples. All analyses were required within 40 days after collection. Based on an evaluation of all environmental samples and field QC blanks extracted and analyzed for TPH, all holding time criteria were met.

Instrument Calibrations—Calibration of the GC used to analyze the samples collected during the SI for TPH as extractables was established by injecting standards at six concentrations, spanning the expected sample concentration range. Initial calibration was conducted before any samples were analyzed to determine the instrument sensitivity. The instrument responses were used to establish the calibration curve. The calibration curve was fitted by a linear equation. This equation was used for TPH as extractables quantitation.

Based on an evaluation of the initial calibration conducted for TPH as extractables analyses, all criteria requirements were met.

Calibration Verification Results—Daily and every 10 samples, a calibration check standard was analyzed. Following the standard analyses, percent recovery values were calculated for each element to verify that the initial calibration remained acceptable. Calibration check standard criteria requirements included 85 to 115 percent, as required by the CAL DHS method. Based on an evaluation of the continuing calibrations conducted, all percent recovery values were within control limits.

Method Blank Results—One method blank was extracted and analyzed with each lot of samples analyzed during the SI for TPH as extractables. Based on an evaluation of all method blanks analyzed, no TPH as extractables was detected in the method blanks.

Surrogate Recoveries—One surrogate compound (i.e., pentacosane) was added to each calibration standard, environmental sample, and laboratory and field QC sample immediately

before TPH as extractables analysis. Surrogate compounds spiked into field samples provide information of the efficiency of all steps of the GC method in recovering this compound from the individual environmental sample matrices. Since pentacosane was spiked into every environmental sample, it was the primary tool used to determine if matrix interference was present during TPH as extractables analysis. All surrogate recoveries were within the recommended control limits. Tables I-18 and I-19 summarize the surrogate recovery results for soil and water samples, respectively.

Matrix Spike/Matrix Spike Duplicate Results—MS/MSD analyses were conducted to assess the accuracy and precision of the laboratory and to evaluate the matrix effect of the sample upon the analytical methodology based upon the percent recovery of each compound. Accuracy was expressed as the percent recovery of the spike compounds. Precision was expressed as the RPD of concentration of the spike compound in the MS/MSD samples. The control limits for percent recoveries are 85-115 percent for TPH as extractables in water samples, and 75-125 percent for TPH as extractables in soil samples. The acceptable RPD upper limits applied to each analytical lot for TPH water is 20 percent and for TPH as extractables in soil samples analyses is 30 percent. MS/MSD samples were evaluated to verify that 1 spiked sample analysis was conducted for 20 environmental samples received by the laboratory, that these analyses were conducted on environmental samples only, and that the recovery and difference results did not indicate laboratory control problems. Tables I-20 and I-21 summarize the MS/MSD results for soil and groundwater samples.

Two MS/MSD analyses were conducted using soil samples collected during the SI. Two recoveries (of 4 reviewed values) calculated from the TPH soil MS/MSD analyses were greater than the 125 percent limit. The MSD recovery of TPH as extractables was 136 percent in GS01-1 and 131 percent in GS13-1-1 MS. The laboratory check sample (LCS) and surrogate recoveries were within acceptable criteria. All RPDs were within the control limits. The fact that high recoveries were observed supports the idea that these deviations were the result of heterogeneity rather than a problem in spiking or an analysis problem. Therefore, no action was taken based on MS/MSD results. One MS/MSD analysis was conducted using groundwater samples collected during the SI. All MS/MSD results were within the control limits.

Laboratory Check Sample Analysis—One LCS was extracted and analyzed with each analytical lot of soil and groundwater samples analyzed by MT. The LCS serves as a monitor of the overall accuracy and performance of all steps in the analysis, including sample preparation. The recovery results of each LCS analyzed were evaluated against 80 to 120 percent for TPH as extractables control limits. Based on an evaluation of all LCS analyses, the percent recoveries were within the control limits.

I.3.4 Assessment Summary

During the SI, 58 samples were collected, resulting in an analytical data base of more than 800 discrete analyses (i.e., compounds). The SI field effort provided 100 percent of the planned samples to complete the assessment. The primary objective of this SI QA program was to assess and summarize the quality and reliability of the data for the intended use and to document factors that may affect the usability of the data. Technical criteria examined during the data validation phase included:

- Holding times
- Instrument calibration
- Blanks
- Surrogate recoveries
- MS/MSD analyses
- Field duplicates
- Internal standard performance
- GC/MS tuning
- Compound quantitation and reported detection limits.

For the purposes of this SI, sample data have met all criteria for their intended use.

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DATA QUALITY ASSESSMENT TABLES

Table: I-1a. Analytical Methods and Total Number of Groundwater Samples Collected South Dakota Air National Guard, Joe Foss Field

Parameters	Analytical Method	Detection Limit	Groundwater Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	MS / MSD	Total Number of Analyses
Volatile Organic Compounds (Solvents)	EPA OLMO1 SOW	a	2	2	2	4	2	0	12
BTEX and TPH as Gasoline	SW8020	a	19	3	3	4	3	4	36
TPH as Extractables	CAL DHS	a	19	3	0	4	3	2	31

a - Method Detection Limits (MDL) are matrix and sample specific.

Table I-2. Field QC Blank Cross Reference
South Dakota Air National Guard, Joe Foss Field

	Lab	Sample	Solvents-WA	BTEX and TPH as Gasoline-WA	TPH as Extractable-WA	Solvents-SO	BTEX and TPH as Gasoline-SO	TPH as Extractable-SO
Sample No.	Sample No.	Date	EPA OLMO1 SOW	SW846 8020	CAL DHS	EPA OLMO1 SOW	SW846 8020	CAL DHS
TB01	95-5340	6/13/95		X				
TB02	95-5341	6/13/95	X	X				
TB03	95-5399	6/15/95				X	X	
TB04	95-5441	6/16/95						
TB05	95-6150	7/18/95	X	X				
TB06	95-7157	8/29/95	X	X				
FB01	95-5342	6/13/95				X	X	X
FB02	95-5343	6/13/95				X	X	X
FB03	95-6151	7/18/95	X	X	X			
FB04	95-6152	7/18/95	X	X	X			
FB04	95-7154	8/29/95	X	X	X			
FB05	95-7155	8/29/95	X	X	X			
EB01	95-5344	6/13/95					X	X
EB03	95-5395	6/15/95		X	X			
EB04	95-5396	6/15/95				X	X	X
EB05	95-6155	7/18/95	X	X	X			
EB06	95-7156	8/29/95	X	X	X			

Table I-3. Data Summary Table: Trip Blanks - Ramp Area and Motor Vehicle Maintenance Facility, South Dakota Air National Guard, Joe Foss Field

Sample No.			TB01	TB02	TB03	TB04	TB05	TB06
Collection Date			6/13/95	6/13/95	6/15/95	6/16/95	6/18/95	8/29/95
Depth (ft)			0	0	0	0	0	0
SOLVENTS/EPA OLMO1 SOW								
Laboratory ID Number			N/A	95-5341	95-5399	N/A	95-6150	95-7157
Parameter	Units	CRQL						
Vinyl Chloride	µg/L	10	N/A	10U	10U	N/A	10U	10U
Chloroform	µg/L	10	N/A	10U	10U	N/A	10U	10U
1,1,1-Trichloroethane	µg/L	10	N/A	10U	10U	N/A	10U	10U
Trichloroethene	µg/L	10	N/A	10U	10U	N/A	10U	10U
1,2-Dichloroethane	µg/L	10	N/A	10U	10U	N/A	10U	10U
Tetrachloroethane	µg/L	10	N/A	10U	10U	N/A	10U	10U
Carbon tetrachloride	µg/L	10	N/A	10U	10U	N/A	10U	10U
BTEX /SW846 8020								
Laboratory ID Number			95-5340	95-5341	95-5399	95-5441	95-6150	95-7157
Parameter	Units	MDL						
Benzene	µg/L	1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	1	<1	<1	<1	<1	<1	<1
Xylenes	µg/L	1	<1	<1	<1	<1	<1	<1

Footnotes:
U-Not detected
N/A-Not analyzed
CRQL-Contract Required Quantitation Limit
MDL-Method Detection Limit

Table I-4. Data Summary Table: Field Blanks - Ramp Area and Motor Vehicle Maintenance Facility, South Dakota Air National Guard, Joe Foss Field

Sample No.			FB01	FB02	FB03	FB04	FB05	FB06
Collection Date			6/13/95	6/13/95	7/18/95	7/18/95	8/29/95	8/29/95
Depth (ft)			0	0	0	0	0	0
SOLVENTS/EPA OLMO1 SOW								
Laboratory ID Number			95-5342	95-5343	95-6151	95-6152	95-7154	95-7155
Parameter	Units	CRQL						
Vinyl Chloride	µg/L	10	10U	10U	10U	10U	10U	10U
Chloroform	µg/L	10	32	10U	10U	10U	29	31
1,1,1-Trichloroethane	µg/L	10	2J	2J	34B	31B	10U	10U
Trichloroethene	µg/L	10	10U	10U	10U	10U	10U	10U
1,2-Dichloroethane	µg/L	10	10U	10U	10U	10U	10U	10U
Tetrachloroethane	µg/L	10	10U	10U	10U	10U	10U	10U
Carbon tetrachloride	µg/L	10	10U	10U	10U	10U	10U	10U
BTEX and TPH as Gasoline/SW846 8020								
Laboratory ID Number			95-5342	95-5343	95-6151	95-6152	95-7154	95-7155
Parameter	Units	MDL						
Benzene	µg/L	1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	1	<1	<1	<1	<1	<1	<1
Xylenes	µg/L	1	<1	<1	<1	<1	<1	<1
TPH as Gasoline	µg/L	7	<7	<7	<7	<7	<7	<7
TPH as Extractable								
Laboratory ID Number			95-5342	95-5343	95-6151	95-6152	95-7154	95-7155
Parameter	Units	PQL						
TPH	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Footnotes:
U-Not detected
N/A-Not analyzed
CRQL-Contract Required Quantitation Limit
MDL-Method Detection Limit
PQL-Practical Quantitation Limit
J-Indicates an estimated value.
B-Compound was detected in the associated method blank as well as in the sample.

Table I-5. Data Summary Table: Equipment Blanks - Ramp Area and Motor Vehicle Maintenance Facility, South Dakota Air National Guard, Joe Foss Field

Sample No.			EB01	EB03	EB04	EB05	EB06
Collection Date			6/13/95	6/15/95	6/15/95	7/18/95	8/29/95
Depth (ft)			0	0	0	0	0
SOLVENTS/EPA OLMO1 SOW							
Laboratory ID Number			N/A	N/A	95-5396	95-6155	95-7156
Parameter	Units	CRQL					
Vinyl Chloride	µg/L	10	N/A	N/A	10U	10U	10U
Chloroform	µg/L	10	N/A	N/A	10U	10U	29
1,1,1-Trichloroethane	µg/L	10	N/A	N/A	10U	28B	10u
Trichloroethene	µg/L	10	N/A	N/A	10U	10U	10U
1,2-Dichloroethane	µg/L	10	N/A	N/A	10U	10U	10U
Tetrachloroethane	µg/L	10	N/A	N/A	10U	10U	10U
Carbon tetrachloride	µg/L	10	N/A	N/A	10U	10U	10U
			N/A	N/A			
BTEX and TPH as Gasoline/SW846 8020							
Laboratory ID Number			95-5344	95-5395	95-5396	95-6155	95-7156
Parameter	Units	MDL					
Benzene	µg/L	1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	1	<1	<1	<1	<1	<1
Xylenes	µg/L	1	<1	<1	<1	<1	<1
TPH as Gasoline	µg/L	7	<7	<7	<7	<7	<7
TPH as Extractable							
Laboratory ID Number			95-5344	95-5391	95-5392	95-6155	95-7156
Parameter	Units	PQL					
TPH	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Footnotes:
U-Not detected
N/A-Not analyzed
CRQL-Contract Required Quantitation Limit
MDL-Method Detection Limit
PQL-Practical Quantitation Limit
B-Compound was detected in the associated method blank as well as in the sample.

Table I-6. Data Summary Table: Field Duplicates-Groundwater - Ramp Area and Motor Vehicle Maintenance Facility, South Dakota Air National Guard, Joe Foss Field

Sample No.			GW12-6	GW12-6	MW1-13-01	MW2-13-1	MW1-13-02	MW2-13-02
Collection Date			6/15/95	6/15/95	7/18/95	7/18/95	8/29/95	8/29/95
SOLVENTS/EPA OLMO1 SOW								
Laboratory ID Number			N/A	N/A	95-6153	95-6154	95-7158	95-7159
Parameter	Units	CRQL						
Vinyl Chloride	µg/L	10	N/A	N/A	10U	10U	10U	10U
Chloroform	µg/L	10	N/A	N/A	10U	10U	10U	10U
1,1,1-Trichloroethane	µg/L	10	N/A	N/A	10U	10U	10U	10U
Trichloroethene	µg/L	10	N/A	N/A	10U	10U	10U	10U
1,2-Dichloroethane	µg/L	10	N/A	N/A	10U	10U	10U	10U
Tetrachloroethane	µg/L	10	N/A	N/A	10U	10U	10U	10U
Carbon tetrachloride	µg/L	10	N/A	N/A	10U	10U	10U	10U
BTEX and TPH as Gasoline/SW846 8020								
Laboratory ID Number			95-5397	95-5398	95-6153	95-6154	95-7158	95-7159
Parameter	Units	MDL						
Benzene	µg/L	1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	1	<1	<1	<1	<1	<1	<1
Xylenes	µg/L	1	<1	<1	<1	<1	<1	<1
TPH as Gasoline	µg/L	7	<7	70	<7	<7	<7	<7
TPH as Extractable								
Laboratory ID Number			95-5397	95-5398	95-6153	95-6154	95-7158	95-7159
Parameter	Units	MDL						
TPH	mg/L	0.1	1	0.91	<0.1	<0.1	<0.1	<0.1

Footnotes:
U-Not detected
N/A-Not analyzed
CRQL-Contract Required Quantitation Limit
MDL-Method Detection Limit

Table I-8. Volatile Organic Compounds (Solvents) Analysis, South Dakota Air National Guard, Joe Foss Field Data Review and Validation

Field Sample Number	EPA Sample No.	Matrix	Sampling Date	Solvents Analysis Date*	Solvents Tuning/Mass Calibration	Initial Calibration	Continuing Calibration	Surrogate Recoveries	Solvents Method Blank
SDG No. 955480									
VBLK3476	NA	SO	NA	6/21/95	All BFB tuning and mass	6/21/95 (Instr ID. 59702E)	6/22/95 (Instr ID. 59702E)	All surrogate recoveries within the	No solvents detected.
					calibration criteria within control	Daily tune in control	Daily tune in control	control limits.	
VBLK3477	NA	WA	NA	6/22/95	limits. 5 tunes applied.	All RRF.0.05	All RRF.0.05		
						%RSD<30.	%D<±25.		
VLBK3478	NA	SO	NA	6/22/95			6/21/95 (Instr ID. 59704G)		
						5/31/95 (Instr ID. 59704G)	Daily tune in control		
EB04	95-5396	WA	6/15/95	6/22/95		Daily tune in control	All RRF.0.05		
						All RRF.0.05	%D<±25.		
TB03	95-5399	WA	6/15/95	6/22/95		%RSD<30.			
							6/22/95 (Instr ID. 59704G)		
GS-13-1-1	95-5480	SO	6/15/95	6/21/95			Daily tune in control		
							All RRF.0.05		
GS-13-1-1MS	95-5480MS	SO	6/15/95	6/21/95			%D<±25.		
GS-13-1-1MSD	95-5480MSD	SO	6/15/95	6/22/95					
GS13-1-4	95-5481	SO	6/15/95	6/21/95					
GS13-2-1	95-5482	SO	6/15/95	6/21/95					
GS13-2-4	95-5483	SO	6/15/95	6/21/95					
GS13-3-1	95-5484	SO	6/15/95	6/21/95					
GS13-3-4	95-5485	SO	6/15/95	6/21/95					
GS13-4-2	95-5486	SO	6/15/95	6/21/95					
GS13-4-4	95-5487	SO	6/15/95	6/21/95					
GS13-4-5	95-5488	SO	6/15/95	6/21/95					
SDG No. FB01									
VBLK3475	NA	WA	NA	6/16/95	All BFB tuning and mass	6/21/95 (Instr ID. 59702E)	6/21/95 (Instr ID. 59702E)	All surrogate recoveries within the	No solvents detected.
					calibration criteria within control	Daily tune in control	Daily tune in control	control limits.	
TB0-2	95-5341	WA	6/13/95	6/16/95	limits. 1 tune applied.	All RRF.0.05	All RRF.0.05		
						%RSD<30.	%D<±25.		
FB01	95-5342	WA	6/13/95	6/16/95					
FB02	95-5343	WA	6/13/95	6/16/95					
VBLK3500	VBLK3500	WA	NA	7/25/95	All BFB tuning and mass	7/25/95 (Instr ID. 59704G)	7/25/95 (Instr ID. 59704G)	All surrogate recoveries within the	Chloroform detected
					calibration criteria within control	Daily tune in control	Daily tune in control	control limits.	(2BJ).
TB05	95-6150	WA	7/18/95	7/25/95	limits. 3 tunes applied.	All RRF.0.05	All RRF.0.05		
						%RSD<30.	%D<±25.		
FB03	95-6151	WA	7/18/95	7/25/95					

Table I-8. Volatile Organic Compounds (Solvents) Analysis, South Dakota Air National Guard, Joe Foss Field Data Review and Validation (Continued)

Field Sample Number	EPA Sample No.	Matrix	Internal Standards	VOC LCS Results	MS/MSD Analysis	Associated QC Blanks	Tentatively Identified Compounds (TIC)	Flag Codes Applied by SAIC
SDG No. 955480								
VBLK3476	NA	SO	BCM, DBF, CHL . All areas and retention times were within control limits and windows, respectively.	All percent recoveries within the control limits.	All recoveries and RPDs were within the control limits.	NA	TIC=0	None Applied
VBLK3477	NA	WA				NA	TIC=0	None Applied
VLBK3478	NA	SO				NA	TIC=0	None Applied
EB04	95-5396	WA				NA	TIC=0	None Applied
TB03	95-5399	WA				NA	TIC=0	None Applied
GS-13-1-1	95-5480	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS-13-1-1MS	95-5480MS	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS-13-1-1MSD	95-5480MSD	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-1-4	95-5481	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-2-1	95-5482	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-2-4	95-5483	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-3-1	95-5484	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-3-4	95-5485	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-4-2	95-5486	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-4-4	95-5487	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
GS13-4-5	95-5488	SO				EB04/TB03/FB01/FB02	TIC=0	None Applied
SDG No. FB01								
VBLK3475	NA	WA	BCM, DBF, CHL . All areas and retention times were within control limits and windows, respectively.	All percent recoveries within the control limits.	QC Blanks No MS/MSD analyses were requested.	NA	TIC=1	None Applied
TB0-2	95-5341	WA				NA	TIC=5	None Applied
FB01	95-5342	WA				NA	TIC=6	None Applied
FB02	95-5343	WA				NA	TIC=1	None Applied
VBLK3500	VBLK3500	WA	BCM, DBF, CHL . All areas and retention times were within control limits and windows, respectively.	All percent recoveries within the control limits.	MS/MSD analyses were performed on TB05.	NA	TIC=0	None Applied
TB05	95-6150	WA				NA	TIC=0	None Applied
FB03	95-6151	WA				NA	TIC=0	None Applied

Table I-8. Volatile Organic Compounds (Solvents) Analysis, South Dakota Air National Guard, Joe Foss Field Data Review and Validation

Field Sample Number	EPA Sample No.	Matrix	Sampling Date	Solvents Analysis Date*	Solvents Tuning/Mass Calibration	Initial Calibration	Continuing Calibration	Surrogate Recoveries	Solvents Method Blank
FB04	95-6152	WA	7/18/95	7/25/95					
MW1-13-01	95-6153	WA	7/18/95	7/25/95					
MW2-13-1	95-6154	WA	7/18/95	7/25/95					
EB05	95-6155	WA	7/18/95	7/25/95					
SDG:7154									
VBLK3543	VBLK3543	WA	NA	9/7/95	All BFB tuning and mass	7/25/95 (Instr ID. 59702E)	9/07/95 (Instr ID. 59702E)	All surrogate recoveries within the	No solvents detected.
					calibration criteria within control	Daily tune in control	Daily tune in control	control limits.	
FB05	95-7154	WA	8/29/95	9/7/95	limits. 2 tunes applied.	All RRF.0.05	All RRF.0.05		
						%RSD<30.	%D<±25.		
FB06	95-7155	WA	8/29/95	9/7/95					
EB06	95-7156	WA	8/29/95	9/7/95					
TB06	95-7157	WA	8/29/95	9/7/95					
MW1-13-02	95-7158	WA	8/29/95	9/7/95					
MW1-13-02	95-7159	WA	8/29/95	9/7/95					

Table I-8. Volatile Organic Compounds (Solvents) Analysis, South Dakota Air National Guard, Joe Foss Field Data Review and Validation (Continued)

Field Sample Number	EPA Sample No.	Matrix	Internal Standards	VOC LCS Results	MS/MSD Analysis	Associated QC Blanks	Tentatively Identified Compounds (TIC)	Flag Codes Applied by SAIC
FB04	95-6152	WA				NA	TIC=0	None Applied
MW1-13-01	95-6153	WA				FB03, FB04/EB05/TB05	TIC=0	None Applied
MW2-13-1	95-6154	WA				FB03, FB04/EB05/TB05	TIC=0	None Applied
EB05	95-6155	WA				NA	TIC=1	None Applied
SDG:7154								
VBLK3543	VBLK3543	WA	BCM, DBF, CHL . All areas	All percent recoveries	MS/MSD analyses	NA	TIC=0	None Applied
			and retention times were	within the control limits.	were performed on FB05.			
FB05	95-7154	WA	within control limits			NA	TIC=0	None Applied
			and windows, respectively.					
FB06	95-7155	WA				NA	TIC=0	None Applied
EB06	95-7156	WA				NA	TIC=3	None Applied
TB06	95-7157	WA				NA	TIC=4	None Applied
MW1-13-02	95-7158	WA				FB05, FB05/EB06/TB06	TIC=0	None Applied
MW1-13-02	95-7159	WA				FB05, FB05/EB06/TB06	TIC=2	None Applied

Footnotes to Table I-8. Solvents Analysis, South Dakota Air National Guard, Joe Foss Field
Data Review and Validation

NA-Not Applicable
*Analysis holding time (14 days) was met for alll samples.
Control limits for water VOC LCS and MS/MSD analyses:
1,1-Dichloroethene (11DCE) %R=(59-172); %RPD=22
Trichlorobenzene (TRCLE) %R=(62-137); %RPD=24
Benzene (C6H6) %R=(66-142); %RPD=21
Toluene (MEC6H5) %R=(66-142); %RPD=21
Chlorobenzene (CLCH5) %R=(60-130):%RPD=21.
Control limits for soil VOC LCS and MS/MSD analyses:
1,1-Dichloroethene (11DCE) %R=(61-145); %RPD=14
Trichlorobenzene (TRCLE) %R=(71-120); %RPD=14
Benzene (C6H6) %R=(76-127); %RPD=11
Toluene (MEC6H5) %R=(76-125); %RPD=13
Chlorobenzene (CLCH5) %R=(75-130):%RPD=13.
Abbreviations:
BFB=4-Bromofluorobenzene

**Table I-10. Solvents Analysis Surrogate Recovery QC Summary: Water
South Dakota National Guard, Joe Foss Field, Sioux Falls, South Dakota**

Solvents Surrogates	Total Number Analyses*	Percent Recovery Range	Percent Recovery Control Limits	Number Within Control Limits	Number Outside Control Limits
d4-1,2-Dichloroethane	21	85-105	76-114	21	0
d8-Toluene	21	93-110	88-110	21	0
4-Bromofluorobenzene	21	89-108	86-115	21	0

* Groundwater Environmental Samples, Trip Blanks, Field Blanks, Equipment Blanks, and Method Blanks.

Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field
Data Review and Validation

Sample Number	EPA Sample No.	Matrix	Sampling Date	Analysis Date*	Initial Calibration	Continuing Calibration	Surrogate Recoveries
BTEX and TPH as Gasoline							
Method blank	Method blank	SO	NA	6/14/95	Calibration date:3/18/1995 Calibration curve model type: linear.	%R within the control limits (85-115).	All %R were within the control limits.
Method blank	Method blank	SO	NA	6/15/95			
Method blank	Method blank	SO	NA	6/16/95			
Method blank	Method blank	WA	NA	6/19/95			
Method blank	Method blank	SO	NA	6/20/95			
Method blank	Method blank	SO	NA	6/21/95			
Method blank	Method blank	SO	NA	6/22/95			
Method blank	Method blank	SO	NA	6/23/95			
GS01-1	95-5329	SO	6/13/95	6/14/95			
GS01-3	95-5330	SO	6/13/95	6/15/95			
GS2-1	95-5331	SO	6/13/95	6/15/95			
GS02-3	95-5332	SO	6/13/95	6/15/95			
GS03-1	95-5333	SO	6/13/95	6/15/95			
GS03-3	95-5334	SO	6/13/95	6/15/95			
GS03-3	95-5334MS	SO	6/13/95	6/15/95			
GS03-3	95-5334MSD	SO	6/13/95	6/15/95			
GS04-1	95-5335	SO	6/13/95	6/16/95			
GS04-3	95-5336	SO	6/13/95	6/16/95			
GS05-2	95-5337	SO	6/13/95	6/16/95			
GS05-2	95-5337MS	SO	6/13/95	6/16/95			
GS05-2	95-5337MSD	SO	6/13/95	6/16/95			
GS05-3	95-5338	SO	6/13/95	6/21/95			

Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field Data Review and Validation (Continued)

Sample Number	EPA Sample No.	Matrix	BTEX Method Blank	BTEX and TPH LCS Results	MS/MSD Analysis	Associated QC Blanks	Flag Codes Applied by SAIC
BTEX and TPH as Gasoline							
Method blank	Method blank	SO	No BTEX and TPH were detected at the concentration greater than the MDL.	LCS recovery was within the control limits (80-120).	All recoveries and relative percent differences were within the control limits.	NA	None Applied
Method blank	Method blank	SO				NA	None Applied
Method blank	Method blank	SO				NA	None Applied
Method blank	Method blank	WA				NA	None Applied
Method blank	Method blank	SO				NA	None Applied
Method blank	Method blank	SO				NA	None Applied
Method blank	Method blank	SO				NA	None Applied
Method blank	Method blank	SO				NA	None Applied
GS01-1	95-5329	SO				FB01, FB02/EB01/TB01	None Applied
GS01-3	95-5330	SO				FB01, FB02/EB01/TB01	None Applied
GS2-1	95-5331	SO				FB01, FB02/EB01/TB01	None Applied
GS02-3	95-5332	SO				FB01, FB02/EB01/TB01	None Applied
GS03-1	95-5333	SO				FB01, FB02/EB01/TB01	None Applied
GS03-3	95-5334	SO				FB01, FB02/EB01/TB01	None Applied
GS03-3	95-5334MS	SO				FB01, FB02/EB01/TB01	None Applied
GS03-3	95-5334MSD	SO				FB01, FB02/EB01/TB01	None Applied
GS04-1	95-5335	SO				FB01, FB02/EB01/TB01	None Applied
GS04-3	95-5336	SO				FB01, FB02/EB01/TB01	None Applied
GS05-2	95-5337	SO				FB01, FB02/EB01/TB01	None Applied
GS05-2	95-5337MS	SO				FB01, FB02/EB01/TB01	None Applied
GS05-2	95-5337MSD	SO				FB01, FB02/EB01/TB01	None Applied
GS05-3	95-5338	SO				FB01, FB02/EB01/TB01	None Applied

Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field
Data Review and Validation

Sample Number	EPA Sample No.	Matrix	Sampling Date	Analysis Date*	Initial Calibration	Continuing Calibration	Surrogate Recoveries
GS06-2	95-5339	SO	6/13/95	6/21/95			
TB-01	95-5340	WA	6/13/95	6/16/95			
TB0-2	95-5341	WA	6/13/95	6/19/95			
FB01	95-5342	WA	6/13/95	6/19/95			
FB02	95-5343	WA	6/13/95	6/19/95			
EB01	95-5344	WA	6/13/95	6/16/95			
EB03	95-5395	WA	6/15/95	6/16/95			
EB04	95-5396	WA	6/15/95	6/16/95			
GW12-5	95-5397	WA	6/15/95	6/16/95			
GW12-6	95-5398	WA	6/15/95	6/17/95			
TB03	95-5399	WA	6/15/95	6/17/95			
GS-13-1-1	95-5480	SO	6/15/95	6/20/95			
GS13-1-4	95-5481	SO	6/15/95	6/20/95			
GS13-1-4	95-5481MS	SO	6/15/95	6/20/95			
GS13-1-4	95-5481MSD	SO	6/15/95	6/20/95			
GS13-2-1	95-5482	SO	6/15/95	6/22/95			
GS13-2-4	95-5483	SO	6/15/95	6/22/95			
GS13-3-1	95-5484	SO	6/15/95	6/22/95			
GS13-3-4	95-5485	SO	6/13/95	6/22/95			
GS13-4-2	95-5486	SO	6/13/95	6/22/95			
GS13-4-4	95-5487	SO	6/13/95	6/23/95			
GS13-4-5	95-5488	SO	6/13/95	6/23/95			
GW12-1	95-5438	WA	6/16/95	6/19/95			
GW12-2	95-5439	WA	6/16/95	6/19/95			

Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field
Data Review and Validation (Continued)

Sample Number	EPA Sample No.	Matrix	BTEX Method Blank	BTEX and TPH LCS Results	MS/MSD Analysis	Associated QC Blanks	Flag Codes Applied by SAIC
GS06-2	95-5339	SO				FB01, FB02/EB01/TB01	None Applied
TB-01	95-5340	WA				FB01, FB02/EB01/TB01	None Applied
TB0-2	95-5341	WA				NA	None Applied
FB01	95-5342	WA				NA	None Applied
FB02	95-5343	WA				NA	None Applied
EB01	95-5344	WA				NA	None Applied
EB03	95-5395	WA				NA	None Applied
EB04	95-5396	WA				NA	None Applied
GW12-5	95-5397	WA				FB01, FB02/EB03/TB03	None Applied
GW12-6	95-5398	WA				FB01, FB02/EB03/TB03	None Applied
TB03	95-5399	WA				NA	None Applied
GS-13-1-1	95-5480	SO				FB01, FB02/EB03/TB03	None Applied
GS13-1-4	95-5481	SO				FB01, FB02/EB04/TB03	None Applied
GS13-1-4	95-5481MS	SO				FB01, FB02/EB04/TB03	None Applied
GS13-1-4	95-5481MSD	SO				FB01, FB02/EB04/TB03	None Applied
GS13-2-1	95-5482	SO				FB01, FB02/EB04/TB03	None Applied
GS13-2-4	95-5483	SO				FB01, FB02/EB04/TB03	None Applied
GS13-3-1	95-5484	SO				FB01, FB02/EB04/TB03	None Applied
GS13-3-4	95-5485	SO				FB01, FB02/EB01/TB01	None Applied
GS13-4-2	95-5486	SO				FB01, FB02/EB01/TB01	None Applied
GS13-4-4	95-5487	SO				FB01, FB02/EB01/TB01	None Applied
GS13-4-5	95-5488	SO				FB01, FB02/EB01/TB01	None Applied
GW12-1	95-5438	WA				FB01, FB02/EB03/TB04	None Applied
GW12-2	95-5439	WA				FB01, FB02/EB03/TB04	None Applied

Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field Data Review and Validation

Sample Number	EPA Sample No.	Matrix	Sampling Date	Analysis Date*	Initial Calibration	Continuing Calibration	Surrogate Recoveries
GW12-03	95-5440	WA	6/16/95	6/19/95			
TB04	95-5441	WA	6/16/95	6/19/95			
GW12-4	95-5442	WA	6/16/95	6/20/95			
Method Blank	Method Blank	WA	NA	7/29/95	Calibration date:6/6/1995 Calibration curve model type: linear.	%R within the control limits (85-115).	All %R were within the control limits.
TB05	95-6150	WA	7/18/95	7/29/95			
FB03	95-6151	WA	7/18/95	7/29/95			
FB04	95-6152	WA	7/18/95	7/29/95			
MW1-13-01	95-6153	WA	7/18/95	7/29/95			
MW2-13-1	95-6154	WA	7/18/95	7/29/95			
MW2-13-1MS	95-6154MS	WA	7/18/95	7/29/95			
MW2-13-1MSD	95-6154MSD	WA	7/18/95	7/29/95			
EB05	95-6155	WA	7/18/95	7/29/95			
MW2-12-1	95-6156	WA	7/18/95	7/29/95			
MW6-12-1	95-6157	WA	7/18/95	7/29/95			
MW3-12-01	95-6158	WA	7/18/95	7/29/95			
MW4-12-01	95-6159	WA	7/18/95	7/29/95			
MW5-12-01	95-6160	WA	7/18/95	7/29/95			
MW1-12-01	95-6161	WA	7/18/95	7/29/95			
Method Blank	Method Blank	WA	NA	9/7/95	Calibration date:6/6/1995 Calibration curve model type: linear.	%R within the control limits (85-115).	All %R were within the control limits.
FB05	95-7154	WA	8/29/95	9/7/95			
FB06	95-7155	WA	8/29/95	9/7/95			
EB06	95-7156	WA	8/29/95	9/7/95			
TB06	95-7157	WA	8/29/95	9/7/95			

Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field Data Review and Validation (Continued)

Sample Number	EPA Sample No.	Matrix	BTEX Method Blank	BTEX and TPH LCS Results	MS/MSD Analysis	Associated QC Blanks	Flag Codes Applied by SAIC
GW12-03	95-5440	WA				FB01, FB02/EB03/TB04	None Applied
TB04	95-5441	WA				NA	None Applied
GW12-4	95-5442	WA				FB01, FB02/EB03/TB04	None Applied
Method Blank	Method Blank	WA	No BTEX and TPH were detected at the concentration greater than the MDL.	LCS recovery was within the control limits (80-120).	All recoveries and relative percent differences were within the control limits.	NA	None Applied
TB05	95-6150	WA				NA	None Applied
FB03	95-6151	WA				NA	None Applied
FB04	95-6152	WA				NA	None Applied
MW1-13-01	95-6153	WA				FB03, FB04/EB05/TB05	None Applied
MW2-13-1	95-6154	WA				FB03, FB04/EB05/TB05	None Applied
MW2-13-1MS	95-6154MS	WA					
MW2-13-1MSD	95-6154MSD	WA					
EB05	95-6155	WA				NA	None Applied
MW2-12-1	95-6156	WA				FB03, FB04/EB05/TB05	None Applied
MW6-12-1	95-6157	WA				FB03, FB04/EB05/TB05	None Applied
MW3-12-01	95-6158	WA				FB03, FB04/EB05/TB05	None Applied
MW4-12-01	95-6159	WA				FB03, FB04/EB05/TB05	None Applied
MW5-12-01	95-6160	WA				FB03, FB04/EB05/TB05	None Applied
MW1-12-01	95-6161	WA				FB03, FB04/EB05/TB05	None Applied
Method Blank	Method Blank	WA	No BTEX and TPH were detected at the concentration greater than the MDL.	LCS recovery was within the control limits (80-120).	All recoveries and relative percent differences were within the control limits.	NA	None Applied
FB05	95-7154	WA				NA	None Applied
FB06	95-7155	WA				NA	None Applied
EB06	95-7156	WA				NA	None Applied
TB06	95-7157	WA				NA	None Applied

Table I-12. **BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field Data Review and Validation**

Sample Number	EPA Sample No.	Matrix	Sampling Date	Analysis Date*	Initial Calibration	Continuing Calibration	Surrogate Recoveries
MW1-13-02	95-7158	WA	8/29/95	9/7/95			
MW1-13-02	95-7159	WA	8/29/95	9/7/95			
MW1-13-02MS	95-7159	WA	8/29/95	9/7/95			
MW1-13-02MSD	95-7159	WA	8/29/95	9/7/95			
MW1-12-02	95-7160	WA	8/29/95	9/8/95			
MW2-12-02	95-7161	WA	8/29/95	9/8/95			
MW3-12-02	95-7162	WA	8/29/95	9/8/95			
MW4-12-02	95-7163	WA	8/29/95	9/8/95			
MW5-12-02	95-7164	WA	8/29/95	9/8/95			
MW6-12-02	95-7165	WA	8/29/95	9/9/95			

Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National, Guard, Joe Foss Field Data Review and Validation (Continued)

Sample Number	EPA Sample No.	Matrix	BTEX Method Blank	BTEX and TPH LCS Results	MS/MSD Analysis	Associated QC Blanks	Flag Codes Applied by SAIC
MW1-13-02	95-7158	WA				FB05, FB06/EB06/TB06	None Applied
MW1-13-02	95-7159	WA				FB05, FB06/EB06/TB06	None Applied
MW1-13-02MS	95-7159	WA				FB05, FB06/EB06/TB06	None Applied
MW1-13-02MSD	95-7159	WA				FB05, FB06/EB06/TB06	None Applied
MW1-12-02	95-7160	WA				FB05, FB06/EB06/TB06	None Applied
MW2-12-02	95-7161	WA				FB05, FB06/EB06/TB06	None Applied
MW3-12-02	95-7162	WA				FB05, FB06/EB06/TB06	None Applied
MW4-12-02	95-7163	WA				FB05, FB06/EB06/TB06	None Applied
MW5-12-02	95-7164	WA				FB05, FB06/EB06/TB06	None Applied
MW6-12-02	95-7165	WA				FB05, FB06/EB06/TB06	None Applied

Footnotes to Table I-12. BTEX and TPH as Gasoline Analyses, South Dakota Air National Guard, Joe Foss Field Data Review and Validation

NA-Not Applicable			
*Analysis holding time (14 days) was met for all samples.			
Control limits for water BTEX and TPH as gasoline MS/MSD analyses:			
BTEX and TPH as gasoline: 85-115; %RPD=20			
Control limits for soil BTEX and TPH as gasoline MS/MSD analyses:			
BTEX and TPH as gasoline: 75-125; %RPD=30.			

Table I-14. BTEX and TPH as Gasoline Analyses Surrogate Recovery QC Summary: Water South Dakota National Guard, Joe Foss Field, Sioux Falls, South Dakota

Solvents Surrogates	Total Number Analyses*	Percent Recovery Range	Percent Recovery Control Limits	Number Within Control Limits	Number Outside Control Limits
Trifluorotoluene	46	92-110	86.8-110.9	46	0

* Groundwater Environmental Samples, MS/MSD Samples, Trip Blanks, Field Blanks, Equipment Blanks, and Method Blanks.

Table I-16. BTEX and TPH as Gasoline MS/MSD QC Summary: Groundwater
South Dakota National Guard, Joe Foss Field, Sioux Falls, South Dakota

	ACCURACY					PRECISION				
Solvents MS/MSD Compounds	MS/MSD Calculated Recoveries	Percent Recovery Range	Percent Recovery Control Limits	Number Within Control Limits	Number Outside Control Limits	MS/MSD Calculated RPD	RPD Range	RPD Limit	Number Within Control Limits	Number Outside Control Limits
Benzene	4	101-105	85-115	4	0	2	0.8	20	2	0
Toluene	4	101-105	85-115	4	0	2	0.8	20	2	0
Xylene	4	100-105	85-115	4	0	2	3.2	20	2	0
Ethybenzene	4	100-105	85-115	4	0	2	4	20	2	0
Matrix spike and matrix spike duplicate analyses performed on samples: MW2-13-1 and MW2-13-02.										

Table I-17. Total Petroleum Hydrocarbons Analysis, South Dakota Air National Guard Joe Foss Field, Sioux Falls, South Dakota, Data Review and Validation

Site ID	Field Sample Number	Matrix	Sampling Date	TPH Analysis Date	Initial Calibration	Calibration Standard (CS)	Method Blank
TPH as Extractable							
BL-43084-1	NA	SO	NA	6/28/95	Calibration date: 6/19/1995 Calibration curve model type: linear.	%R within the control limits (85-115).	No TPH were detected at the concentration greater than the MDL.
GS-13-1-1	95-5480	SO	6/15/95	6/28/95			
GS-13-1-1MS	95-5480MS	SO	6/15/95	6/28/95			
GS-13-1-1MSD	95-5480MSD	SO	6/15/95	6/28/95			
GS13-1-4	95-5481	SO	6/15/95	6/28/95			
GS13-2-1	95-5482	SO	6/15/95	6/28/95			
GS13-2-4	95-5483	SO	6/15/95	6/28/95			
GS13-3-1	95-5484	SO	6/15/95	6/28/95			
GS13-3-4	95-5485	SO	6/15/95	6/28/95			
GS13-4-2	95-5486	SO	6/15/95	6/28/95			
GS13-4-4	95-5487	SO	6/15/95	6/28/95			
GS13-4-5	95-5488	SO	6/15/95	6/28/95			
FB01	95-5342	WA	6/13/95	6/22/95			
FB02	95-5343	WA	6/13/95	6/22/95			
EB01	95-5344	WA	6/13/95	6/22/95			
GS01-1	95-5329	SO	6/13/95	6/22/95			
GS01-1	95-5329MS	SO	6/13/95	6/22/95			
GS01-1	95-5329MSD	SO	6/13/95	6/22/95			
GS01-3	95-5330	SO	6/13/95	6/22/95			
GS02-1	95-5331	SO	6/13/95	6/22/95			
GS02-3	95-5332	SO	6/13/95	6/22/95			
GS03-1	95-5333	SO	6/13/95	6/22/95			
GS03-3	95-5334	SO	6/13/95	6/22/95			
GS04-1	95-5335	SO	6/13/95	6/22/95			
GS04-3	95-5336	SO	6/13/95	6/22/95			

Table I-17. Total Petroleum Hydrocarbons Analysis, South Dakota Air National Guard Joe Foss Field, Sioux Falls, South Dakota, Data Review and Validation

Site ID	Field Sample Number	Matrix	Sampling Date	Surrogate Recoveries	Laboratory Control Sample (LCS)	Matrix Spike/ MatrixSpike Duplicate	Associated Field Blank/ Equipment Blank	Data Validation Flags Applied by SAIC
TPH as Extractable								
BL-43084-1	NA	SO	NA	All %R were within the	LCS recovery was within	All recoveries were within	NA	None Applied
				control limits.	the control limits (80-120).	the control limits, except:		
GS-13-1-1	95-5480	SO	6/15/95			%R =136 in GS01-1MSD	FB01, FB02/EB04	None Applied
						%R=131 in GS13-1-1MS.		
GS-13-1-1MS	95-5480MS	SO	6/15/95				FB01, FB02/EB04	None Applied
GS-13-1-1MSD	95-5480MSD	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-1-4	95-5481	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-2-1	95-5482	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-2-4	95-5483	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-3-1	95-5484	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-3-4	95-5485	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-4-2	95-5486	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-4-4	95-5487	SO	6/15/95				FB01, FB02/EB04	None Applied
GS13-4-5	95-5488	SO	6/15/95				FB01, FB02/EB04	None Applied
FB01	95-5342	WA	6/13/95				NA	None Applied
FB02	95-5343	WA	6/13/95				NA	None Applied
EB01	95-5344	WA	6/13/95				NA	None Applied
GS01-1	95-5329	SO	6/13/95				FB01, FB02/EB01	None Applied
GS01-1	95-5329MS	SO	6/13/95				FB01, FB02/EB01	None Applied
GS01-1	95-5329MSD	SO	6/13/95				FB01, FB02/EB01	None Applied
GS01-3	95-5330	SO	6/13/95				FB01, FB02/EB01	None Applied
GS02-1	95-5331	SO	6/13/95				FB01, FB02/EB01	None Applied
GS02-3	95-5332	SO	6/13/95				FB01, FB02/EB01	None Applied
GS03-1	95-5333	SO	6/13/95				FB01, FB02/EB01	None Applied
GS03-3	95-5334	SO	6/13/95				FB01, FB02/EB01	None Applied
GS04-1	95-5335	SO	6/13/95				FB01, FB02/EB01	None Applied
GS04-3	95-5336	SO	6/13/95				FB01, FB02/EB01	None Applied

Table I-17. Total Petroleum Hydrocarbons Analysis, South Dakota Air National Guard Joe Foss Field, Sioux Falls, South Dakota, Data Review and Validation

Site ID	Field Sample Number	Matrix	Sampling Date	TPH Analysis Date	Initial Calibration	Calibration Standard (CS)	Method Blank
GS05-2	95-5337	SO	6/13/95	6/22/95			
GS05-3	95-5338	SO	6/13/95	6/22/95			
GS06-2	95-5339	SO	6/13/95	6/22/95			
EB03	95-5395	WA	6/15/95	6/21/95			
EB04	95-5396	WA	6/15/95	6/21/95			
GW12-5	95-5397	WA	6/15/95	6/21/95			
GW12-6	95-5398	WA	6/15/95	6/21/95			
GW12-1	95-5438	WA	6/16/95	6/21/95			
GW12-2	95-5439	WA	6/16/95	6/21/95			
GW12-03	95-5440	WA	6/16/95	6/21/95			
GW12-4	95-5442	WA	6/16/95	6/21/95			
Method Blank	Method Blank	WA	NA	7/26/95	Calibration date: 6/19/1995 Calibration curve model type: linear.	%R within the control limits (85-115).	No TPH were detected at the concentration greater than the MDL.
FB03	95-6151	WA	7/18/95	7/26/95			
FB04	95-6152	WA	7/18/95	7/26/95			
MW1-13-01	95-6153	WA	7/18/95	7/26/95			
MW2-13-1	95-6154	WA	7/18/95	7/26/95			
EB05	95-6155	WA	7/18/95	7/26/95			
MW2-12-1	95-6156	WA	7/18/95	7/26/95			
MW2-12-1	95-6157	WA	7/18/95	7/26/95			
MW3-12-01	95-6158	WA	7/18/95	7/26/95			
MW4-12-01	95-6159	WA	7/18/95	7/26/95			
MW5-12-01	95-6160	WA	7/18/95	7/26/95			
MW1-12-01	95-6161	WA	7/18/95	7/26/95			
Method Blank	Method Blank	WA	NA	9/1/95	Calibration date: 6/19/1995 Calibration curve model type: linear.	%R within the control limits (85-115).	No TPH were detected at the concentration greater than the MDL.
FB05	95-7154	WA	8/29/95	9/1/95			

Table I-17. Total Petroleum Hydrocarbons Analysis, South Dakota Air National Guard Joe Foss Field, Sioux Falls, South Dakota, Data Review and Validation

Site ID	Field Sample Number	Matrix	Sampling Date	Surrogate Recoveries	Laboratory Control Sample (LCS)	Matrix Spike/ MatrixSpike Duplicate	Associated Field Blank/ Equipment Blank	Data Validation Flags Applied by SAIC
GS05-2	95-5337	SO	6/13/95				FB01, FB02/EB01	None Applied
GS05-3	95-5338	SO	6/13/95				FB01, FB02/EB01	None Applied
GS06-2	95-5339	SO	6/13/95				FB01, FB02/EB01	None Applied
EB03	95-5395	WA	6/15/95				NA	None Applied
EB04	95-5396	WA	6/15/95				NA	None Applied
GW12-5	95-5397	WA	6/15/95				FB01, FB02/EB03	None Applied
GW12-6	95-5398	WA	6/15/95				FB01, FB02/EB03	None Applied
GW12-1	95-5438	WA	6/16/95				FB01, FB02/EB03	None Applied
GW12-2	95-5439	WA	6/16/95				FB01, FB02/EB03	None Applied
GW12-03	95-5440	WA	6/16/95				FB01, FB02/EB03	None Applied
GW12-4	95-5442	WA	6/16/95				FB01, FB02/EB03	None Applied
Method Blank	Method Blank	WA	NA	All %R were within the control limits.	LCS recovery was within the control limits (80-120).	MS/MSD analyses were performed on TB05.	NA	None Applied
FB03	95-6151	WA	7/18/95				NA	None Applied
FB04	95-6152	WA	7/18/95				NA	None Applied
MW1-13-01	95-6153	WA	7/18/95				FB03, FB04/EB05	None Applied
MW2-13-1	95-6154	WA	7/18/95				FB03, FB04/EB05	None Applied
EB05	95-6155	WA	7/18/95				NA	None Applied
MW2-12-1	95-6156	WA	7/18/95				FB03, FB04/EB05	None Applied
MW2-12-1	95-6157	WA	7/18/95				FB03, FB04/EB05	None Applied
MW3-12-01	95-6158	WA	7/18/95				FB03, FB04/EB05	None Applied
MW4-12-01	95-6159	WA	7/18/95				FB03, FB04/EB05	None Applied
MW5-12-01	95-6160	WA	7/18/95				FB03, FB04/EB05	None Applied
MW1-12-01	95-6161	WA	7/18/95				FB03, FB04/EB05	None Applied
Method Blank	Method Blank	WA	NA	All %R were within the control limits.	LCS recovery was within the control limits (80-120).	MS/MSD analyses were performed on MW2-12-02.	NA	None Applied
FB05	95-7154	WA	8/29/95			All percent recoveries and difference were within the	NA	None Applied

Table I-17. Total Petroleum Hydrocarbons Analysis, South Dakota Air National Guard Joe Foss Field, Sioux Falls, South Dakota, Data Review and Validation

Site ID	Field Sample Number	Matrix	Sampling Date	TPH Analysis Date	Initial Calibration	Calibration Standard (CS)	Method Blank
FB06	95-7155	WA	8/29/95	9/1/95			
EB06	95-7156	WA	8/29/95	9/1/95			
MW1-13-02	95-7166	WA	8/29/95	9/1/95			
MW1-13-02	95-7167	WA	8/29/95	9/1/95			
MW1-12-02	95-7168	WA	8/29/95	9/1/95			
MW2-12-02MS	95-7174	WA	8/29/95	9/1/95			
MW2-12-02MSD	95-7175	WA	8/29/95	9/1/95			
MW2-12-02	95-7169	WA	8/29/95	9/1/95			
MW3-12-02	95-7170	WA	8/29/95	9/1/95			
MW4-12-02	95-7171	WA	8/29/95	9/1/95			
MW5-12-02	95-7172	WA	8/29/95	9/1/95			
MW6-12-02	95-7173	WA	8/29/95	9/1/95			

Table I-17. Total Petroleum Hydrocarbons Analysis, South Dakota Air National Guard Joe Foss Field, Sioux Falls, South Dakota, Data Review and Validation

Site ID	Field Sample Number	Matrix	Sampling Date	Surrogate Recoveries	Laboratory Control Sample (LCS)	Matrix Spike/ MatrixSpike Duplicate	Associated Field Blank/ Equipment Blank	Data Validation Flags Applied by SAIC
FB06	95-7155	WA	8/29/95			control limits.	NA	None Applied
EB06	95-7156	WA	8/29/95				NA	None Applied
MW1-13-02	95-7166	WA	8/29/95				FB05, FB06/EB06	None Applied
MW1-13-02	95-7167	WA	8/29/95				FB05, FB06/EB06	None Applied
MW1-12-02	95-7168	WA	8/29/95				FB05, FB06/EB06	None Applied
MW2-12-02MS	95-7174	WA	8/29/95				FB05, FB06/EB06	None Applied
MW2-12-02MSD	95-7175	WA	8/29/95				FB05, FB06/EB06	None Applied
MW2-12-02	95-7169	WA	8/29/95				FB05, FB06/EB06	None Applied
MW3-12-02	95-7170	WA	8/29/95				FB05, FB06/EB06	None Applied
MW4-12-02	95-7171	WA	8/29/95				FB05, FB06/EB06	None Applied
MW5-12-02	95-7172	WA	8/29/95				FB05, FB06/EB06	None Applied
MW6-12-02	95-7173	WA	8/29/95				FB05, FB06/EB06	None Applied

Footnotes to Table I-17. . Total Petroleum Hydrocarbons Analyses, South Dakota Air National Guard Joe Foss Field, Sioux Falls, South Dakota, Data Review and Validation

NA-Not Applicable

***TPH as Extractables:**

Extraction holding time (7 days) was met for water and soil samples.

Analysis holding time (40 days) was met for water and soilsamples.

***TPH as Gasoline:**

Analysis holding time (14 days) was met for soil samples.

Control limits for water MS/MSD analyses:

TPH %R=85-115; %RPD=20

Control limits for soil MS/MSD analyses:

TPH %R=75-125; %RPD=30

Table I-19. Total Petroleum Hydrocarbons as Extractables Surrogate Recovery QC Summary: Water
South Dakota National Guard, Joe Foss Field, Sioux Falls, South Dakota

TPH as Extractables Surrogate	Total Number Analyses*	Percent Recovery Range	Percent Recovery Control Limits	Number Within Control Limits	Number Outside Control Limits
Pentacosane	24	66-98	52.8-143.1	24	0
Triacontane	13	74-105	63.6-131.7	13	0

* Groundwater Environmental Samples, MS/MSD, Field Blanks, Equipment Blanks, and Method Blanks.

Table I-20. TPH as Extractables MS/MSD QC Summary: Soil
South Dakota National Guard, Joe Foss Field, Sioux Falls, South Dakota

	ACCURACY					PRECISION				
MS/MSD Compounds	MS/MSD Calculated Recoveries	Percent Recovery Range	Percent Recovery Control Limits	Number Within Control Limits	Number Outside Control Limits	MS/MSD Calculated RPD	RPD Range	RPD Limit	Number Within Control Limits	Number Outside Control Limits
TPH as Extractables	4	100-136	75-125	2	2	2	8.6	30	2	0
Matrix spike and matrix spike duplicate analyses performed on samples:GS13-1-1 and GS01-1.										

Table I-21. TPH as Extractables MS/MSD QC Summary: Water
South Dakota National Guard, Joe Foss Field, Sioux Falls, South Dakota

	ACCURACY					PRECISION				
MS/MSD Compounds	MS/MSD Calculated Recoveries	Percent Recovery Range	Percent Recovery Control Limits	Number Within Control Limits	Number Outside Control Limits	MS/MSD Calculated RPD	RPD Range	RPD Limit	Number Within Control Limits	Number Outside Control Limits
TPH as Extractables	2	101-104	75-125	2	0	2	2.3	20	1	0

Matrix spike and matrix spike duplicate analyses performed on samples: MW2-12-02.

APPENDIX J. GEOTECHNICAL DATA

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SIEVE ANALYSIS TESTS

PROJECT SDANG JOE FOSS FIELD
SIOUX FALLS SD

DATE 7-26-95

REPORTED TO SAIC ATTN: MR JANARDAN PATEL

JOB NO. 95-530

SAMPLE NO.	MW12-01	MW12-02	MW12-03	MW12-04
DEPTH (ft)	14'-16'	6'-8'	10'-12'	6'-8'
CLASSIFICATION (ASTM: D 2487)				
Symbol	(SP)	(SP-SM)	(SP)	(SP-SM)
Description	SAND, medium to fine grained with a little gravel, brown	SAND WITH SILT, medium to fine grained, with a little gravel, brown	SAND, fine to medium grained, with a little gravel, brown	SAND WITH SILT medium to fine grained, with a little gravel, brown
MECHANICAL ANALYSIS:				
Dry Weight of Total Sample (grams)	777.7	591.6	645.3	812.5
Based on Total Sample				
% Finer Than				
1"	100	100	100	100
3/4"	100	100	100	100
3/8"	100	100	96	99
# 4	95	97	95	94
# 10	77	86	90	83
# 40	38	38	50	39
# 200	1.9	6.7	3.8	5.3

twin city testing corporation

SL-46 (80-A)

SIEVE ANALYSIS TESTS

PROJECT SDANG JOE FOSS FIELD
SIOUX FALLS SD

DATE 7-26-95

REPORTED TO SAIC ATTN: MR JANARDAN PATEL

JOB NO. 95-530

SAMPLE NO.	MW12-05	MW13-01		
DEPTH (ft)	6'-8'	12'-14'		
CLASSIFICATION (ASTM: D 2487)				
Symbol	(SP-SM)	(SP-SC)		
Description	SAND WITH SILT fine grained, with a little gravel, brown	SAND WITH CLAY medium to fine grained, with gravel, brown		
MECHANICAL ANALYSIS:				
Dry Weight of Total Sample (grams)	627.4	3680.1		
Based on Total Sample % Finer Than				
1"	100	100		
3/4"	100	96		
3/8"	99	84		
# 4	98	71		
# 10	96	55		
# 40	78	32		
# 200	7.4	12		

SL-46 (80-A)

twin city testing corporation

Huntingdon

Sample No. MW12-01

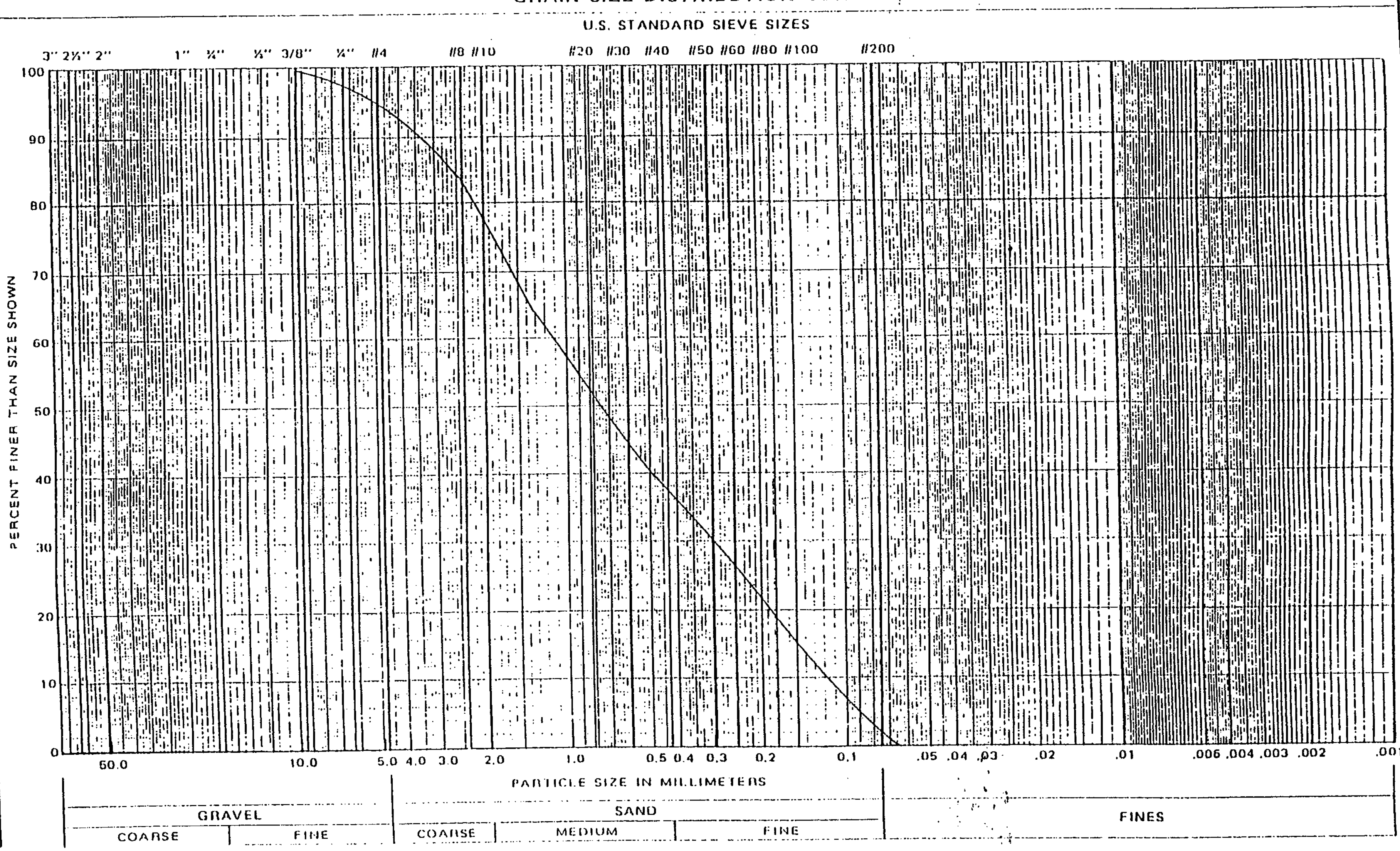
Classification (ASTM:D2487) SAND, medium to fine grained, with a little gravel, brown (SP)

DEPTH: 14'-16'

Project: SDANG JOE FOSS FIELD
SIOUX FALLS SD

Reported To: SAIC ATTN: MR JANARDAN PATEL

GRAIN SIZE DISTRIBUTION CURVE



Huntingdon

Sample No. MW12-02

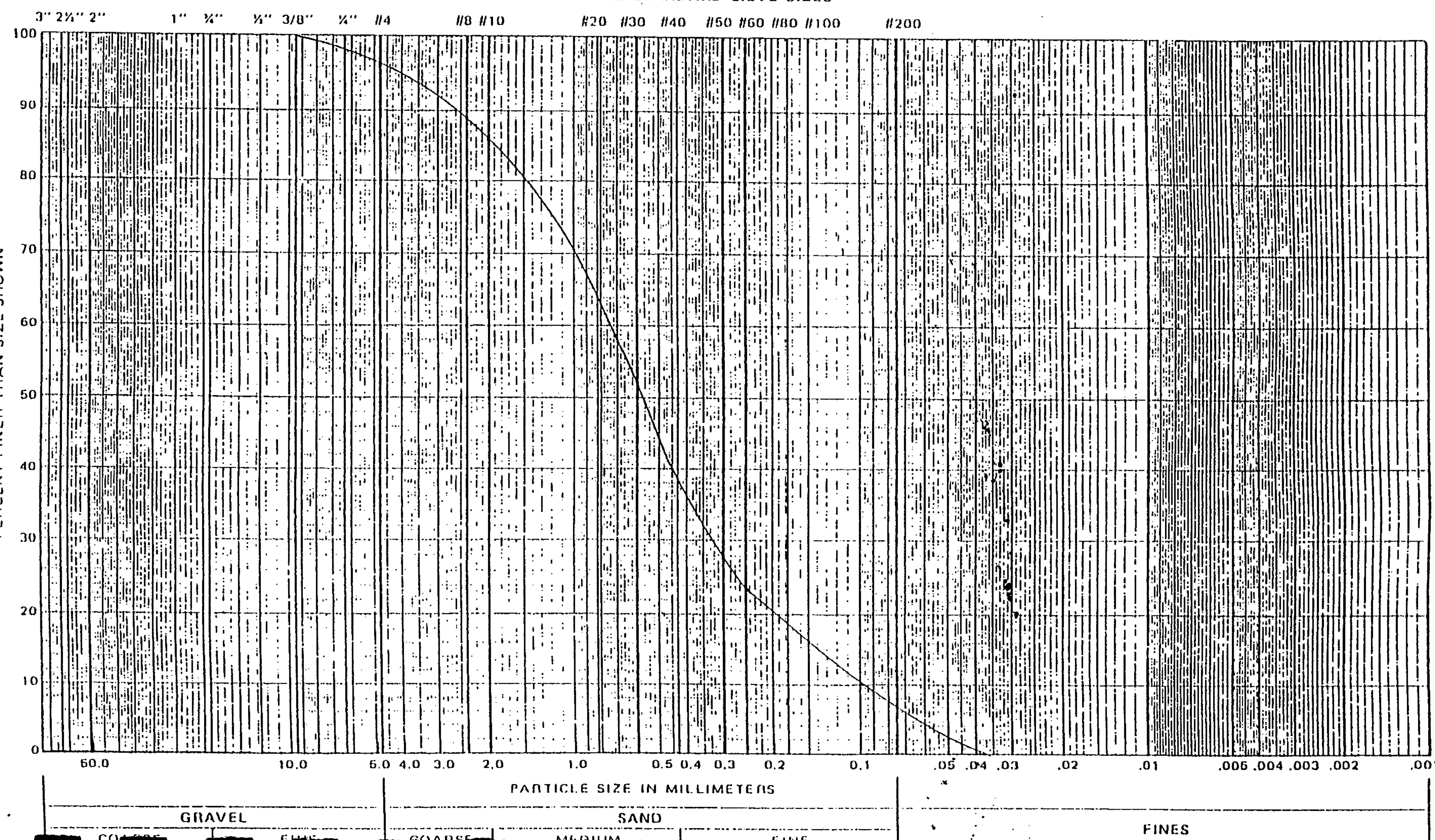
Classification (ASTM:D2487) SAND WITH SILT, medium to fine grained, with a little gravel, brown (SP-SM)

DEPTH: 6'-8' (

Project: SDANG JOE FOSS FIELD
SIOUX FALLS SD

Reported To: SAIC ATTN: MR JANARDAN PATEL

GRAIN SIZE DISTRIBUTION CURVE



Huntingdon

Sample No. MW12-03

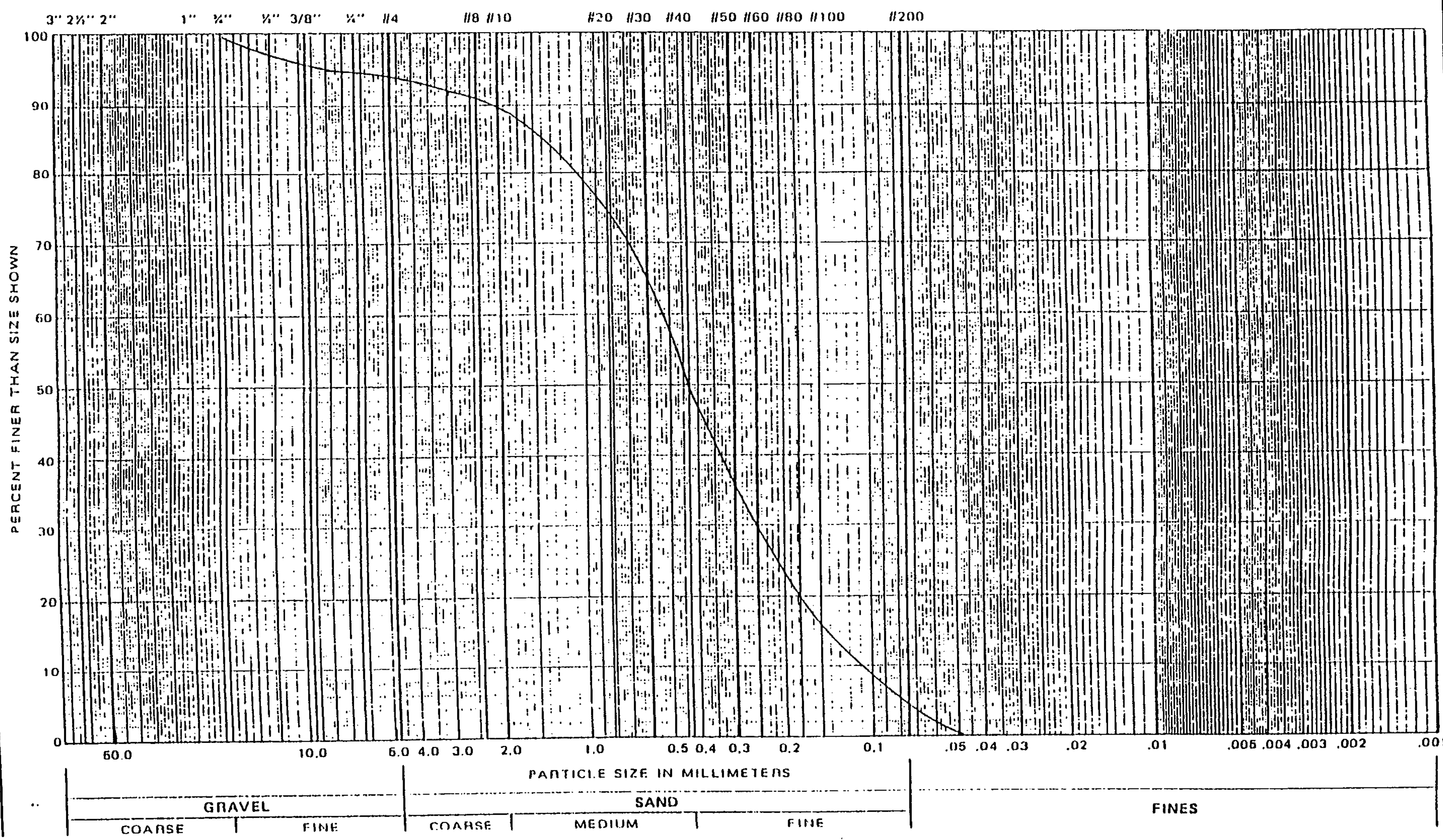
Classification (ASTM:D2487) SAND, fine to medium grained, with little gravel, brown (SP)

DEPTH 10'-12'

Project: SDANG JOE FOSS FIELD SIOUX FALLS SD

Reported To: SAIC ATTN: MR JANARDAN PATEL

GRAIN SIZE DISTRIBUTION CURVE



Huntingdon

Sample No. MW12-04

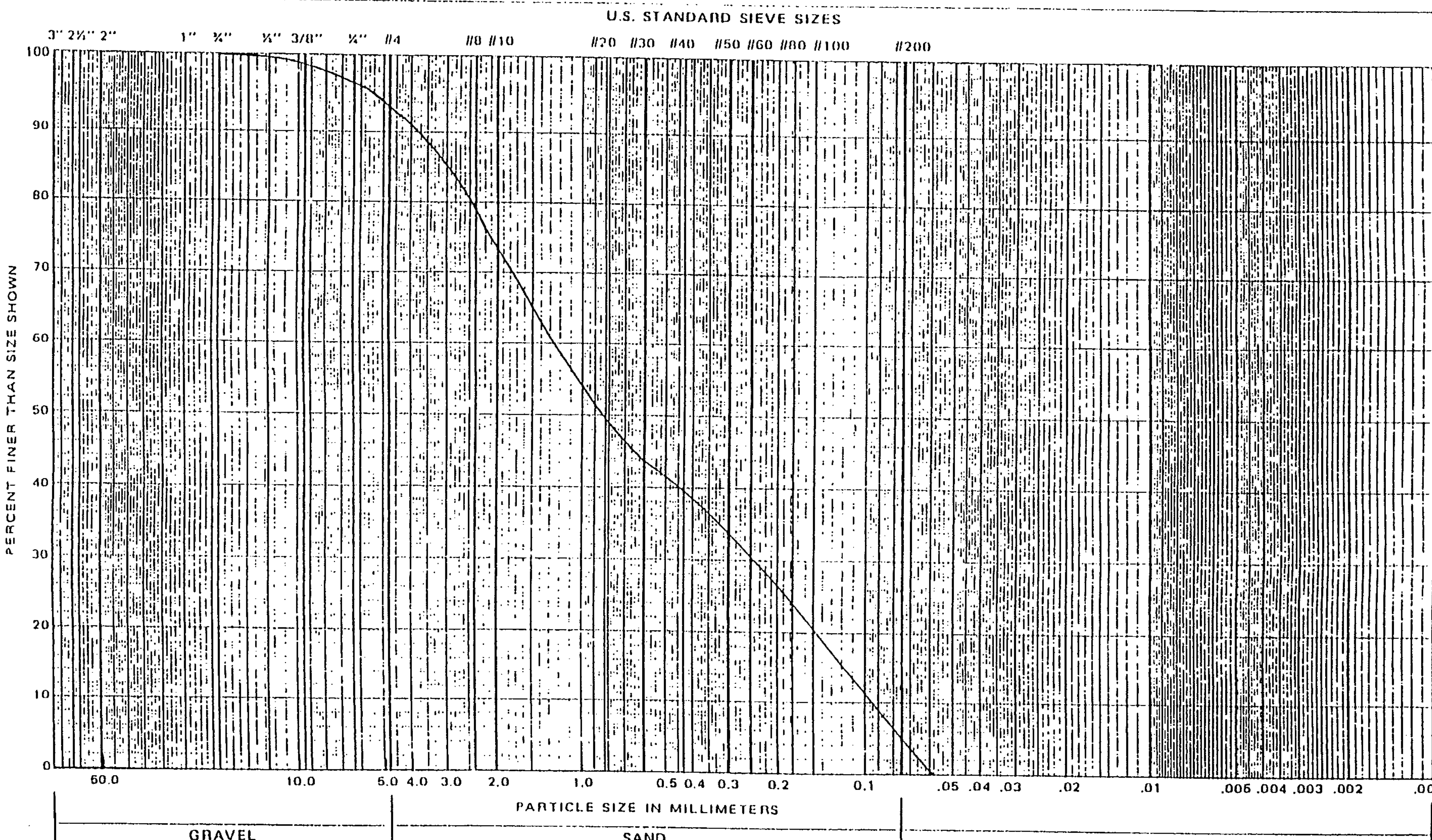
Classification (ASTM:D2487) SAND WITH SILT, medium to fine grained, with a little gravel, brown (SP-SM)

DEPTH: 6'-8'

Project: SDANG JOE FOSS FIELD
SIOUX FALLS SD

Reported To: SAIC ATTN: MR JANARDAN PATEL

GRAIN SIZE DISTRIBUTION CURVE



Huntingdon

Sample No. 1MW12L-05

Classification (ASTM:D2487) SAND WITH SILT,

fine grained, with a little gravel, brown (SP-SM)

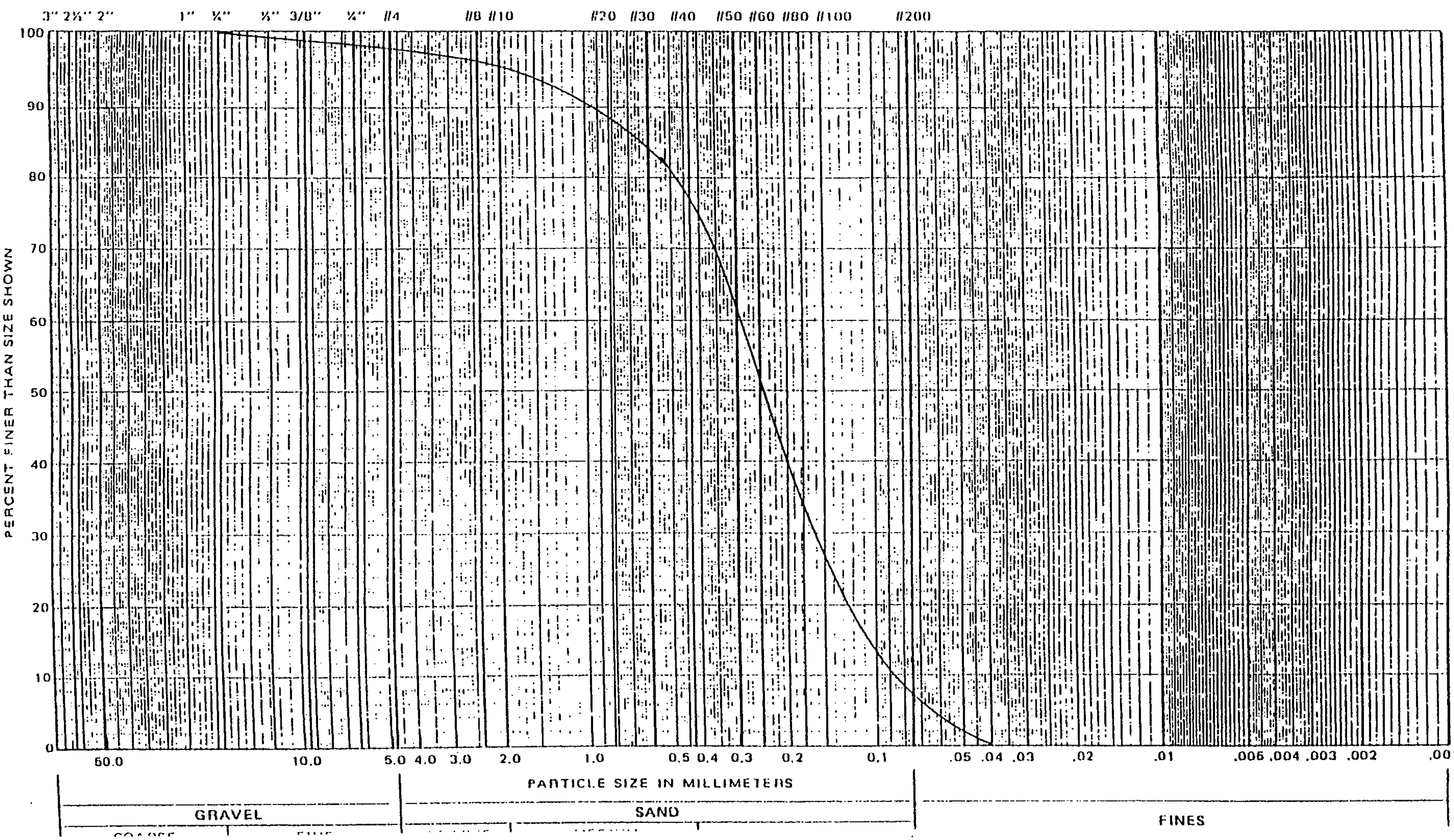
DEPTH: 6'-8'

Project: SDANG JOE FOSS FIELD

SIOUX FALLS SD

Reported To: SAIC ATTN: MR JANARDAN PATEL

GRAIN SIZE DISTRIBUTION CURVE



Huntingdon

Sample No. MW13-01

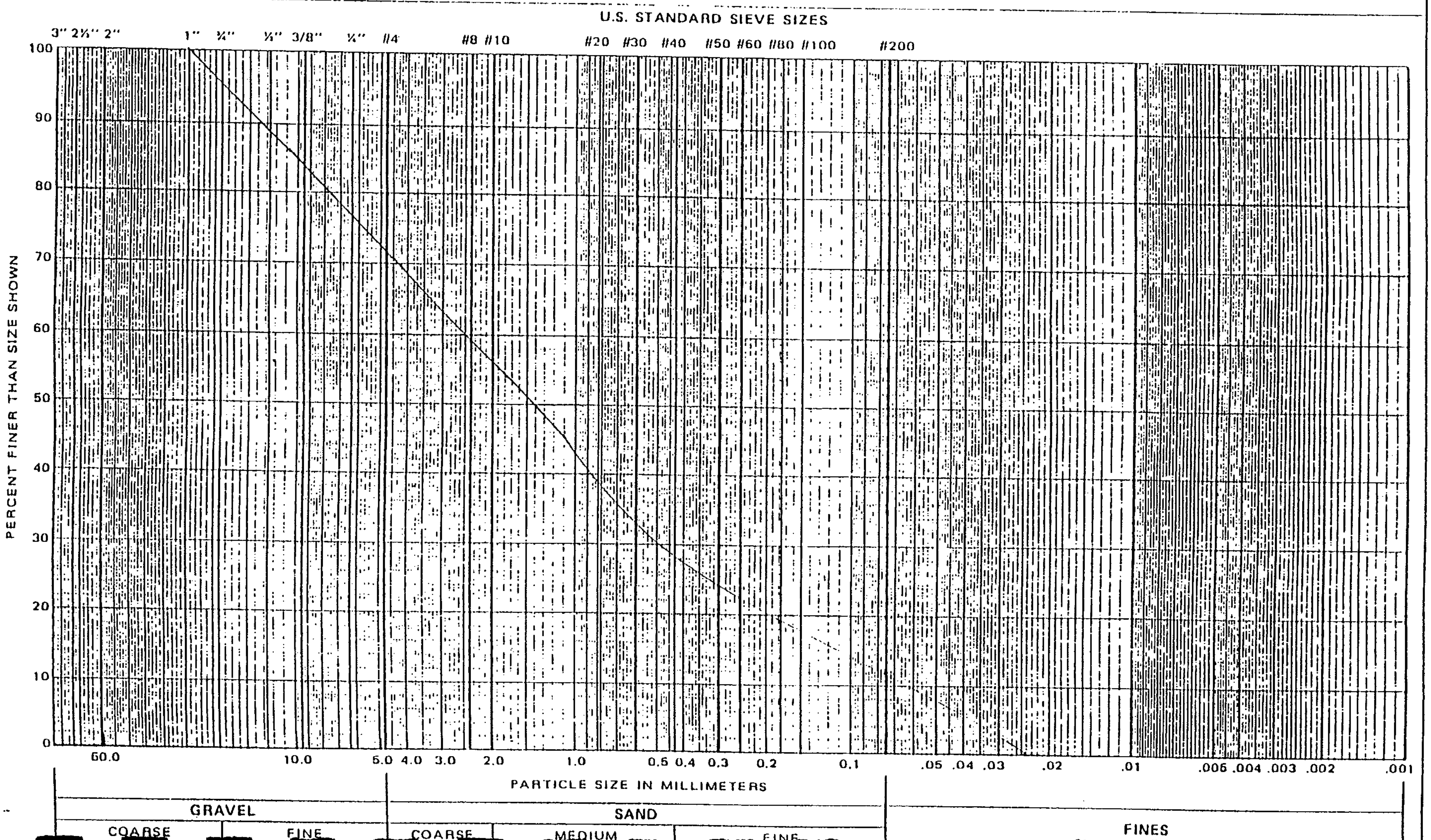
Classification (ASTM:D2487) SAND WITH CLAY, medium to fine grained, with gravel, brown (SP-SC)

DEPTH 12'-14'

Project: SDANG JOE FOSS FIELD
SIOUX FALLS SD

Reported To: SAIC ATTN: MR JANARDAN PATEL

GRAIN SIZE DISTRIBUTION CURVE



APPENDIX K. FIELD SAMPLING FORMS

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS01-1
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6.13.95 1115
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
N/A
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
N/A
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6.13.95 1115
Sampling Depth: 2'-4' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS01-3
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other: ______
Date and Time Sample Collected: 6.13.95 1205
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
N/A
Date and Time of Purging: Start: ______ End: ______
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH ______ Temp. ______ Cond: ______ Alkalinity: ______
N/A
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH ______ Temp. ______ Cond: ______ Turbidity: ______
N/A
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6.13.95 1205
Sampling Depth: 6-8' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS02-1
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6.13.95 1425
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80 °F

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: N/A End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: N/A Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6.13.95 1425
Sampling Depth: 2-4' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
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Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS02-3
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·13·95 1445
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: N/A Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6·13·95 1445
Sampling Depth: 6'-8' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS03-1
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6.13.95 1520
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):

Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: End:
Comments:

N/A

Groundwater:

Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

N/A

Surface Water:

Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

N/A

Soils/Sediment Sampling:

Date and Time Collected: 6.13.95 1520
Sampling Depth: 2'-4' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS03-3
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other: ______
Date and Time Sample Collected: 6.13.95 1550
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method: ______
Quantity of Water Purged: ______
Disposition of Purge Water: N/A
Date and Time of Purging: Start: ______ End: ______
Comments: ______

Groundwater:
Date and Time Collected: ______
Sampling Depth: ______
Water Level: ______
Sampling Method/Equipment: N/A
Field Measurements: pH ______ Temp ______ Cond: ______ Alkalinity: ______
Date and Time Filtered (if applicable): ______
Comments: ______

Surface Water:
Date and Time Collected: ______
Collection Method: ______
Date and Time Filtered (if applicable): N/A
Field Measurements: pH ______ Temp ______ Cond: ______ Turbidity: ______
Comments: ______

Soils/Sediment Sampling:
Date and Time Collected: 6.13.95 1550
Sampling Depth: 6'-8' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments: ______

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS04-1
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·13·95 1717
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: N/A End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: N/A Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6·13·95 1717
Sampling Depth: 2'–4' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS04-3
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other: ______
Date and Time Sample Collected: 6.13.95 1740
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method: ______
Quantity of Water Purged: ______
Disposition of Purge Water: ______
Date and Time of Purging: Start: ______ End: ______
Comments: ______
N/A

Groundwater:
Date and Time Collected: ______
Sampling Depth: ______
Water Level: ______
Sampling Method/Equipment: ______
Field Measurements: pH ______ Temp: ______ Cond: ______ Alkalinity: ______
Date and Time Filtered (if applicable): ______
Comments: ______
N/A

Surface Water:
Date and Time Collected: ______
Collection Method: ______
Date and Time Filtered (if applicable): ______
Field Measurements: pH ______ Temp: ______ Cond: ______ Turbidity: ______
Comments: ______
N/A

Soils/Sediment Sampling:
Date and Time Collected: 6.13.95 1740
Sampling Depth: 6-8' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments: ______

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS05-2, GS06-2
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6.13.95 1830, 1915
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment: N/A
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable): N/A
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6.13.95 1830, 1915
Sampling Depth: 4-6' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments: GS06-2 IS A DUPLICATE SAMPLE OF GS05-2

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS05-3
Sampling Location: SITE 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·13·95 1840
Weather Conditions: PARTLY CLOUDY, WINDY FROM SOUTH, ~80°F

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:
N/A

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:
N/A

Soils/Sediment Sampling:
Date and Time Collected: 6·13·95 1840
Sampling Depth: 6-8' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GW01
Sampling Location: SITE 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·16·95 0900
Weather Conditions: SUNNY, WINDY

Purging Information (if applicable):

Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A

Date and Time of Purging: Start: End:
Comments:

Groundwater:

Date and Time Collected: 6·16·95 0900
Sampling Depth: 10'-12' BLS
Water Level: NR
Sampling Method/Equipment: GEOPROBE WATER SAMPLER USING MANUAL INERTIA
Field Measurements: pH 7.40 Temp: 72.9°F Cond: 6.07x100 µS/cm Alkalinity:
Date and Time Filtered (if applicable): N/A
Comments:

Surface Water:

Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable): N/A
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:

Date and Time Collected:
Sampling Depth:
Sampling Method: N/A
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GW02
Sampling Location: SITE 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·16·95 0955
Weather Conditions: SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected: 6·16·95 0955
Sampling Depth: 10-12' BLS
Water Level: NR
Sampling Method/Equipment: GEOPROBE WATER SAMPLER USING MANUAL INERTIA
Field Measurements: pH 7.38 Temp: 76.3°F Cond: 7.2x100 µs/cm Alkalinity:
Date and Time Filtered (if applicable): N/A
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method: N/A
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GW03
Sampling Location: SITE 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6.16.95 1045
Weather Conditions: SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected: 6.16.95 1045
Sampling Depth: 10-12' BLS
Water Level: NR
Sampling Method/Equipment: GEOPROBE WATER SAMPLER USING MANUAL INERTIA
Field Measurements: pH 7.92 Temp: 76.6°F Cond: 4.68x100 μS/cm Alkalinity:
Date and Time Filtered (if applicable): N/A
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method: N/A
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GW04
Sampling Location: SITE 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·16·95 1125
Weather Conditions: SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected: 6·16·95 1125
Sampling Depth: 10'-12' BLS
Water Level: NR
Sampling Method/Equipment: GEOPROBE WATER SAMPLER USING MANUAL INERTIA
Field Measurements: pH 7.29 Temp: 74.2°F Cond: 9.00x100 µS/cm Alkalinity: NR
Date and Time Filtered (if applicable): N/A
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable): N/A
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method: N/A
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GW05
Sampling Location: SITE 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6.15.95 1020
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):

Method:
Quantity of Water Purged:
Disposition of Purge Water:
N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:

Date and Time Collected: 6.15.95 1020
Sampling Depth: 10'-12' BLS
Water Level: NR
Sampling Method/Equipment: GEOPROBE WATER SAMPLER USING MANUAL INERTIA
Field Measurements: pH 6.70 Temp: 74.6°F Cond: 12.0x100 µS/cm Alkalinity: NR
Date and Time Filtered (if applicable): NA
Comments:
GW006 IS A DUPLICATE OF GW05

Surface Water:

Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable): N/A
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:

Date and Time Collected:
Sampling Depth:
Sampling Method: N/A
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW 12-01
Sampling Location: Site 12
Sample Type: ~~☒ GW~~ 7-14-95 ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-14-95 17:15
Weather Conditions: Hot, Sunny, wind from South

Purging Information (if applicable):

Method:
Quantity of Water Purged:
Disposition of Purge Water:

Date and Time of Purging: Start: End:
Comments:

Groundwater:

Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:

Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:

Date and Time Collected: 07-14-95
Sampling Depth: 14-16ft
Sampling Method: Split spoon
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW12-02
Sampling Location: Site 12
Sample Type: ☒ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-15-95 07:20
Weather Conditions: Partly Cloudy, Wind from North, Temperature in 80's

Purging Information (if applicable):

Method:
Quantity of Water Purged:
Disposition of Purge Water:

Date and Time of Purging: Start: End:
Comments:

Groundwater:

Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:

Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:

Date and Time Collected: 07-15-95 07:20
Sampling Depth: 6-8 ft
Sampling Method: split spoon
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW12-03
Sampling Location: Site 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other: ____
Date and Time Sample Collected: 07-15-95 20:10
Weather Conditions: Partly Cloudy, Wind from North, Temperature in 80's

Purging Information (if applicable):
Method: ____
Quantity of Water Purged: ____
Disposition of Purge Water: ____
Date and Time of Purging: Start: ____ End: ____
Comments: ____

Groundwater:
Date and Time Collected: ____
Sampling Depth: ____
Water Level: ____
Sampling Method/Equipment: ____
Field Measurements: pH ____ Temp: ____ Cond: ____ Alkalinity: ____
Date and Time Filtered (if applicable): ____
Comments: ____

Surface Water:
Date and Time Collected: ____
Collection Method: ____
Date and Time Filtered (if applicable): ____
Field Measurements: pH ____ Temp: ____ Cond: ____ Turbidity: ____
Comments: ____

Soils/Sediment Sampling:
Date and Time Collected: 07-15-95 20:10
Sampling Depth: 10-12 ft
Sampling Method: Split Spoon
Comments: ____

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW 12-04
Sampling Location: Site 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other: ______
Date and Time Sample Collected: 07-15-95 16:00
Weather Conditions: Partly Cloudy, Wind from North, Temperature in 80's

Purging Information (if applicable):
Method: ______
Quantity of Water Purged: ______
Disposition of Purge Water: ______
Date and Time of Purging: Start: ______ End: ______
Comments: ______

Groundwater:
Date and Time Collected: ______
Sampling Depth: ______
Water Level: ______
Sampling Method/Equipment: ______
Field Measurements: pH ______ Temp: ______ Cond: ______ Alkalinity: ______
Date and Time Filtered (if applicable): ______
Comments: ______

Surface Water:
Date and Time Collected: ______
Collection Method: ______
Date and Time Filtered (if applicable): ______
Field Measurements: pH ______ Temp: ______ Cond: ______ Turbidity: ______
Comments: ______

Soils/Sediment Sampling:
Date and Time Collected: 07-15-95 16:00
Sampling Depth: 6-8ft
Sampling Method: Split Spoon
Comments: ______

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW12-05
Sampling Location: Site 12
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-15-95 18:05
Weather Conditions: Partly Cloudy, Wind from North, Temperature in 80's

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:

Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 07-15-95 18:05
Sampling Depth: 6-8 ft
Sampling Method: Split Spoon
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW1-12-01
Sampling Location: Site 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-18-95 14:10
Weather Conditions: Sunny, wind from North, Temperature 80's to 90's

Purging Information (if applicable):
Method: Submersible Pump
Quantity of Water Purged: 26 gallons
Disposition of Purge Water: Disposed of down sanitary sewer

Date and Time of Purging: Start: NR End: 1410
Comments:

Groundwater:
Date and Time Collected: 07-18-95 14:10
Sampling Depth: 8.5 to 10.5 ft
Water Level: 8.23 ft
Sampling Method/Equipment: Disposable polypropylene bailer
Field Measurements: pH 6.37 Temp: 59.8 °F Cond: 1040 uS/cm Alkalinity: NR
Date and Time Filtered (if applicable): NA
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method:
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW2-12-1
Sampling Location: Site 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-18-95 13:00
Weather Conditions: Sunny, wind from North, Temperature 80's to 90's

Purging Information (if applicable):
Method: Submersible pump
Quantity of Water Purged: 40 gallons
Disposition of Purge Water: Disposed of down sanitary sewer
Date and Time of Purging: Start: NR End: 1300
Comments:

Groundwater:
Date and Time Collected: 07-18-95 13:00
Sampling Depth: 7 to 10 ft
Water Level: 7.16 ft
Sampling Method/Equipment: Disposable polypropylene bailer
Field Measurements: pH 5.48 Temp: 58.6 °F Cond: 1350 uS/cm Alkalinity: NR
Date and Time Filtered (if applicable): NA
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method:
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW3-12-01
Sampling Location: Site 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-18-95 14:50
Weather Conditions: Sunny, wind from North, Temperature 80's to 90's

Purging Information (if applicable):
Method: Submersible Pump
Quantity of Water Purged: 25 gallons
Disposition of Purge Water: Disposed of down sanitary Sewer

Date and Time of Purging: Start: NA End: 1450
Comments:

Groundwater:
Date and Time Collected: 07-18-95 14:50
Sampling Depth: 8 to 11 ft
Water Level: ~~6.9~~ 7-18-95 7.98 ft
Sampling Method/Equipment: Disposable polypropylene Bailer
Field Measurements: pH 6.38 Temp: 60.8 °F Cond: 1041 mS/cm Alkalinity: NA
Date and Time Filtered (if applicable): NA
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method:
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW 4-12-01
Sampling Location: Site 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other: ______
Date and Time Sample Collected: 07-18-95 16:00
Weather Conditions: Sunny, wind from North, Temperature 80's to 90's

Purging Information (if applicable):
Method: Submersible Pump
Quantity of Water Purged: 26 gallons
Disposition of Purge Water: Disposed of down sanitary Sewer
Date and Time of Purging: Start: NA End: 1600
Comments:

Groundwater:
Date and Time Collected: 07-18-95 16:00
Sampling Depth: 8 to 11 ft
Water Level: 7.88 ft
Sampling Method/Equipment: Disposable polypropylene Bailer
Field Measurements: pH 6.96 Temp: 60.2°F Cond: 78uS/cm Alkalinity: NA
Date and Time Filtered (if applicable): NA
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH ______ Temp: ______ Cond: ______ Turbidity: ______
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method:
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW5-12-01
Sampling Location: Site 12
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-18-95 1650
Weather Conditions: Sunny, wind from North, Temperature 80's to 90's

Purging Information (if applicable):
Method: Submersible Pump
Quantity of Water Purged: 32 gallons
Disposition of Purge Water: Disposed of down sanitary sewer
Date and Time of Purging: Start: NA End: 1650
Comments:

Groundwater:
Date and Time Collected: 07-18-95 1650
Sampling Depth: 6 to 9 ft
Water Level: 6.23 ft
Sampling Method/Equipment: Disposable polypropylene Bailer
Field Measurements: pH 6.96 Temp: 59.5°F Cond: 832 mS/cm Alkalinity: NA
Date and Time Filtered (if applicable): NA
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH ____ Temp: ____ Cond: ____ Turbidity: ____
Comments:

Soils/Sediment Sampling:
Date and Time Collected:
Sampling Depth:
Sampling Method:
Comments:

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Well Development Form
(Field Sheet)

Project Name and Number: SDANG 01 0513 04 3423 006

Well Number and Location: MW 12 - 01

Development Crew: Pete Ferm / Tracy Buss Driller (if applicable): Lyle Porter / Mark Lote

Water Levels/Time: Initial: 8.22 Pumping: 8.65 Final: 8.26

Total Well Depth: Initial: 15 Final: 15

Date and Time: Begin: 0730 @ 7/17/95 Completed: 7/17/95 @ 0845

Development: Method(s): PVC bailer with nylon rope for 10 min; Grundfos Redi-flow pump

Total Quantity of Water Removed: 126 (28.6 well volumes) gals

4.4 gal / well volume

Date/Time and Pump Setting	Discharge Rate* and Measurement Method	Field Measurements				Remarks (Including Sand Production)
		Temp ~~°C~~ F	Specific Conductivity (umhos/cm)	pH (Standard Units)	Turbidity	
7/17/95 0740	2 GPM Graduated Bucket	60.4	1017	6.18	very	14 ft
0750	" "	59.5	1034	5.70	cloudy	14 ft
0803	" "	59.6	1018	6.48	clear	12 ft
0815	" "	59.8	1040	6.65	clear	10 ft
0830	" "	59.7	1034	6.51	clear	12 ft
0843	" "	59.7	1041	6.53	clear	14 ft
						Developed

*gallons per minute or bailer capacity

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Well Development Form
(Field Sheet)

Project Name and Number: SOANG 01051304 3423 008

Well Number and Location: MW12-02

Development Crew: Pete Fellon / T. Boggs Driller (if applicable): Lyle Portel, Mark Ledd

Water Levels/Time: Initial: 7.15 Pumping: 7.32 Final: 7.16

Total Well Depth: Initial: 15.05 Final: 15.05

Date and Time: Begin: 7/17/95 @ 0925 Completed: 7/17/95 @ 1114

Development: Method(s): PVC bailer w/ nylon rope to get initial out Grundfos Rediflow pump

Total Quantity of Water Removed: 199 (38.7 well volumes) gals

5.14 gal / well vol

Date/Time and Pump Setting 150	Discharge Rate* and Measurement Method	Field Measurements				Remarks (Including Sand Production)
		Temp ~~(°C)~~ F	Specific Conductivity (umhos/cm)	pH (Standard Units)	Turbidity	
7/17/95 0928	5gal/3min (bucket)	60.5	1600	6.44	very	
0936	2 GPM (Graduated bucket)	—	—	—	—	14 ft
0954	" "	60.9	1557	6.31	Cloudy	"
1002	" "	61.0	1480	6.28	Clear	"
1011	" "	58.9	1450	6.27	clear	12 ft
1023	" "	59.1	1470	6.25	clear	10 ft
1035	" "	59.1	1460	6.26	clear	9 ft
1045	" "	~~60.1~~ 61.0	*1402	6.35	Clear	10 ft * calibration was noted off
1100	" "	59.1	1390	6.38	clear	12 ft
11 11	" "	59.5	1410	6.38	clear	14 ft
						Developed

*gallons per minute or bailer capacity

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Well Development Form
(Field Sheet)

Project Name and Number: SOANG 01 0513 04 3423 008

Well Number and Location: MW12-03

Development Crew: T. Busy Driller (if applicable): Mack lesley

Water Levels/Time: Initial: 7.96 Pumping: 8.16 Final: 7.98

Total Well Depth: Initial: 15 Final: 15

Date and Time: Begin: 7/17/95 @ 1255 Completed: 7/17/95 @ 1412

Development: Method(s): PVC Bailer w/ nylon rope
Grundfos Rediflow pump

Total Quantity of Water Removed: 147 (32.1 well vol.) gals
4.58 gal/well vol

Date/Time and Pump Setting 150	Discharge Rate* and Measurement Method	Field Measurements				Remarks (Including Sand Production)
		Temp (°F)	Specific Conductivity (umhos/cm)	pH (Standard Units)	Turbidity	
1256	5gal/3 min bucket	67.6	952	6.59	very	2.5ppm
1301	2gpm (graduated bucket)	—	—	—	—	14ft
1320	" "	61.7	981	6.25	clear	14ft 3ppm
1335	" "	61.0	970	6.15	clear	12ft
1346	" "	62.0	1001	6.62	clear	10ft 2ppm
1359	" "	61.8	1008	6.62	clear	12 ft
1412	" "	62.0	1000	6.60	clear	14 ft Developed

*gallons per minute or bailer capacity

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Well Development Form
(Field Sheet)

Project Name and Number: SDANG 01 0513 04 3423 008

Well Number and Location: MW12-04

Development Crew: P. Ferron / T. Bugg Driller (if applicable): Mark Lody

Water Levels/Time: Initial: 7.85 Pumping: 8.08 Final: 7.88

Total Well Depth: Initial: 15.15 Final: 15.15

Date and Time: Begin: 7/17/95 @ 1505 Completed: 7/17/95 @ 1625

Development: Method(s): PVC bailer w/ nylon rope; Grundofos Rediflow

Total Quantity of Water Removed: 157 gal (33.1 well vol.) gals

4.75 gal / well vol

Date/Time and Pump Setting	Discharge Rate* and Measurement Method	Field Measurements: Temp (°C)	Specific Conductivity (umhos/cm)	pH (Standard Units)	Turbidity	Remarks (Including Sand Production)
7/17/95 1505	5 gal/3 min bucket	64.7	846	6.82	very	08 ft
1509	2 gpm (graduated bucket)	—	—	—	"	14 ft BKG
1524	" "	61.5	789	6.67	clear	12 ft BKG
1536	" "	61.5	780	6.62	clear	10 ft BKG
1546	" "	61.3	759	6.61	clear	12 ft BKG
1600	" "	6.13	777	6.71	clear	14 ft BKG
1615	" "	~~6.13~~ 61.3	770	6.75	clear	14 ft BKG
1625	" "	~~6.13~~ 61.3	772	6.77	clear	Developed

*gallons per minute or bailer capacity

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Well Development Form
(Field Sheet)

Project Name and Number: SDANG 01 0513 04 3423 008

Well Number and Location: MW12-05

Development Crew: P. Fellon / T. Bug Driller (if applicable): Lyle Porter / Mark Lasley

Water Levels/Time: Initial: 7.18 Pumping: 7.35 Final: 7.25

Total Well Depth: Initial: 14.97 Final: 14.97

Date and Time: Begin: 7/17/95 @ ~~1655~~ 1655 Completed: 7/17/95 @ 1809

Development: Method(s): PVC Bailer w/ Nylon Rope
Grundfos Red-flow pump

Total Quantity of Water Removed: 148 gal (29.25 well vol) gals
5.06 gal / well vol

Date/Time and Pump Setting 150	Discharge Rate* and Measurement Method	Field Measurements: Temp (°C)	Specific Conductivity (umhos/cm)	pH (Standard Units)	Turbidity	Remarks (Including Sand Production)
7/17/95 1656	5 gal/3 min (bucket)	66.4	871	6.89	very	0.5 ppm
1700	2 gpm (graduated bucket)	—	—	—	"	
1723	" "	60.4	820	6.65	clear	14 ft
1734	" "	60.6	825	6.71	clear	12 ft BKG
1744	"	60.5	819	6.80	clear	10 ft
1756	"	60.4	818	6.78	clear	11 ft BKG
1809	"	60.2	814	6.73	clear	13 ft
						Developed

*gallons per minute or bailer capacity

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS13-1-1
Sampling Location: SITE 13
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other: ____
Date and Time Sample Collected: 6.15.95 1330
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):

Method: ____
Quantity of Water Purged: ____
Disposition of Purge Water: ____
Date and Time of Purging: Start: N/A End: ____
Comments: ____

Groundwater:

Date and Time Collected: ____
Sampling Depth: ____
Water Level: ____
Sampling Method/Equipment: ____
Field Measurements: pH ____ Temp: N/A Cond: ____ Alkalinity: ____
Date and Time Filtered (if applicable): ____
Comments: ____

Surface Water:

Date and Time Collected: ____
Collection Method: ____
Date and Time Filtered (if applicable): N/A
Field Measurements: pH ____ Temp: ____ Cond: ____ Turbidity: ____
Comments: ____

Soils/Sediment Sampling:

Date and Time Collected: 6.15.95 1330
Sampling Depth: 2-4' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments: ____

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS13-1-4
Sampling Location: SITE 13 ~~1~~ MLC
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·15-95 1410
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: N/A Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6·15·95 1410
Sampling Depth: 8-10' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS13-2-1
Sampling Location: SITE 13
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·15·95 1450
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: N/A End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: N/A Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6·15·95
Sampling Depth: 2-4' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS13-2-4
Sampling Location: SITE 13
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·15·95 1540
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water: N/A
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment: N/A
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable): N/A
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6·15·95 1540
Sampling Depth: 8'-10' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS13-3-1
Sampling Location: SITE 13
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6-15-95 1622
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: N/A End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH ____ Temp: N/A Cond: ____ Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH ____ Temp: N/A Cond: ____ Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6·15·95 1622
Sampling Depth: 2-4' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS13-3-4
Sampling Location: SITE 13
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·15·95 1720
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: N/A End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:
N/A

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:
N/A

Soils/Sediment Sampling:
Date and Time Collected: 6·15·95 1720
Sampling Depth: 8'-10' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON, M. CRAMER
Sampling Point Number: GS13-4-2
Sampling Location: SITE 13
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6·15·95 1800
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):

Method: N/A
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: End:
Comments:

Groundwater:

Date and Time Collected: N/A
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:

Date and Time Collected: N/A
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: ~~Cond:~~ Turbidity:
Comments:

Soils/Sediment Sampling:

Date and Time Collected: 6·15·95 1800
Sampling Depth: 4-6' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. FERRON M. CRAMER
Sampling Point Number: GS13-4-4 ; GS13-4-5
Sampling Location: SITE 13
Sample Type: ☐ GW ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 6.15.95 1820 ; 1840
Weather Conditions: PARTLY SUNNY, WINDY

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: N/A End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: N/A Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: N/A Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 6.15.95 1820 ; 1840
Sampling Depth: 8'-10' BLS
Sampling Method: GEOPROBE SOIL SAMPLER WITH LINER
Comments: GS13-4-5 IS A DUPLICATE SAMPLE OF GS13-4-4.

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW 13-01
Sampling Location: Site 13
Sample Type: ~~GW~~ 7-13-95 ☐ SW ☒ Soil ☐ SED ☐ Other:
Date and Time Sample Collected: 07-13-95 17:00
Weather Conditions: Very hot >100°F, Wind from South, a few Clouds

Purging Information (if applicable):
Method:
Quantity of Water Purged:
Disposition of Purge Water:
Date and Time of Purging: Start: End:
Comments:

Groundwater:
Date and Time Collected:
Sampling Depth:
Water Level:
Sampling Method/Equipment:
Field Measurements: pH Temp: Cond: Alkalinity:
Date and Time Filtered (if applicable):
Comments:

Surface Water:
Date and Time Collected:
Collection Method:
Date and Time Filtered (if applicable):
Field Measurements: pH Temp: Cond: Turbidity:
Comments:

Soils/Sediment Sampling:
Date and Time Collected: 07-13-95 1700
Sampling Depth: 12 to 14 ft
Sampling Method: Shelby Tube
Comments:

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Sampling Form
(Field Sheet)

Project Name and Number: SDANG SI 01-0827-04-3423-008
Sampling Crew: P. Ferron, T. Bugg
Sampling Point Number: MW1-13-01
Sampling Location: Site 13
Sample Type: ☒ GW ☐ SW ☐ Soil ☐ SED ☐ Other: ______
Date and Time Sample Collected: 07-18-95 11:10
Weather Conditions: Sunny, wind from North, Temperature 80's to 90's

Purging Information (if applicable):
Method: Bailer
Quantity of Water Purged: 10 gallons
Disposition of Purge Water: Disposed of down sanitary sewer

Date and Time of Purging: Start: 10:49 End: 11:10
Comments: ______

Groundwater:
Date and Time Collected: 07-18-95 11:10
Sampling Depth: 8 to 11 ft
Water Level: 8.05 ft
Sampling Method/Equipment: Disposable polypropylene bailer
Field Measurements: pH 6.50 Temp: 63.4°F Cond: 1476 mS/cm Alkalinity: NR
Date and Time Filtered (if applicable): NA
Comments: ______

Surface Water:
Date and Time Collected: ______
Collection Method: ______
Date and Time Filtered (if applicable): ______
Field Measurements: pH ______ Temp: ______ Cond: ______ Turbidity: ______
Comments: ______

Soils/Sediment Sampling:
Date and Time Collected: ______
Sampling Depth: ______
Sampling Method: ______
Comments: ______

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Well Development Form
(Field Sheet)

Project Name and Number: SDANG 01-0513-04-3423-008

Well Number and Location: MW13-01

Development Crew: Pete Ferron / Tracy Boggs Driller (if applicable): Lyle Porter / Mark Lesly

Water Levels/Time: Initial: 8.02 Pumping: unable to get reading water level meter too big Final: 8.02

Total Well Depth: Initial: 19.48 Final: Same

Date and Time: Begin: 7/16/95 @ 1205 Completed: 1333 @ 7/16/95

Development: Method(s): bailer w/ rope to get PVC shavings etc (PVC bailer/nylon rope) Grondofos Rediflow pump

Total Quantity of Water Removed: ≈175 Gal (95 well volumes) gals
1.83 gal / 1 well volume

Date/Time and Pump Setting	Discharge Rate* and Measurement Method	Field Measurements Temp (°F)	Specific Conductivity (~~umhos~~ siemens/cm)	pH (Standard Units)	Turbidity	Remarks (Including Sand Production)
7/16/95 1205	4 GPM Grad. bucket	66.7 F	1180	6.25	very	PVC shavings 3 1 ft off bottom (18')
1225	2.5 GPM "	60.8 F	1190	6.27	Grey is dark	
1234	" "	63.0 F	1070	6.51	Grayish Clear	16 ft
1243	" "	61.8 F	1090	6.50	Tanish clear	14 ft
1254	" "	60.9 F	1060	6.90	clear	14
1300	" "	62.1 F	1010	6.65	Clear	12 ft
1305	2 GPM "	62.4 F	960	6.43	Clear	18 ft
1325	" "	61.3	962	6.45	clear	16 ft
1333	" "	61.1	963	6.41	clear	16 ft
						Developed.

*gallons per minute or bailer capacity

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APPENDIX L. FIELD LOGBOOK

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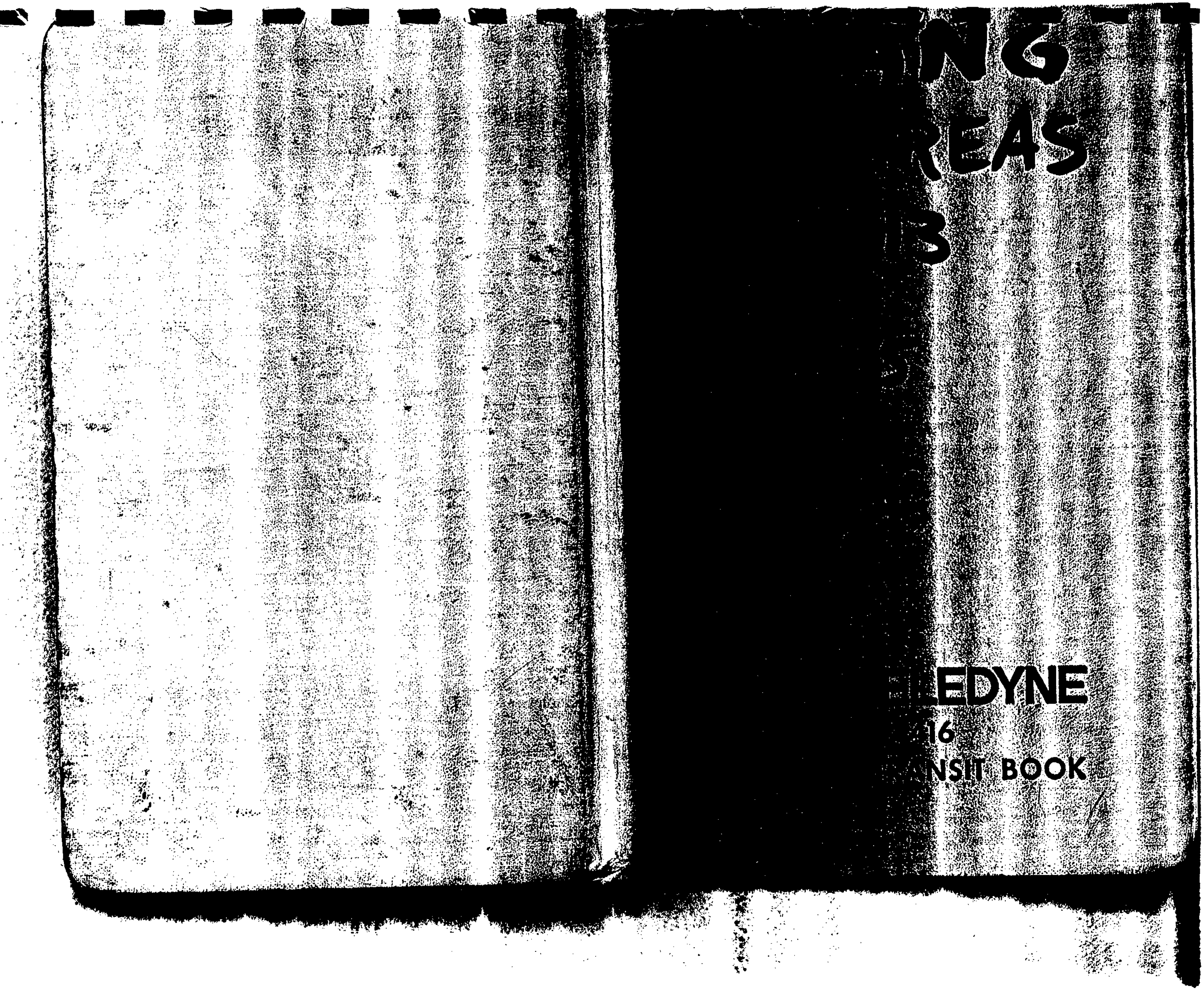
PER: PAT PATELL

(703) 749-8903

SCIENCE APPLICATIONS INTERNATIONAL CORP

(SAIC)

McLEAN, VA.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Joe Foss Field SDANG

INDEX

3

1

6 5/6/95

1300 Met with Captain Alvin Punt
at SDANG Joe Foss Field
discussed (1) the storage area available
for SAIC (2) storage area for pallet
of bentonite of Target (Subcontractors
for SAIC for SOV and Geoprobe) (3)
took a look at Areas 12 + 13 and
discussed the dimentions of each
site and the drawings in the
Work Plan (4) Using Base traffic cones
to delineate Work Zones
We looked at Utility drawings and
"As Built" drawing to try to locate
Utilities
Captain Punt arranged to meet utilities
tomorrow at 9AM and should be
completed by Noon
1500 left site to check in Motel
Weather Hot and Humid

6-6-95

8:30 AM - Called Columbus to find out status of Purchase orders

9:30 - Met with Captain Rant

Discussed following

1. Use of Cellular Phones on Base
2. Use of Camera
3. Any Warning Signals
4. Access to Copy Machine on Base
5. Storage of Equipment during period (3-4 week) between sampling events
6. Use of Base Generators - No

1100 Went Back to Motel to make phone calls

4

5

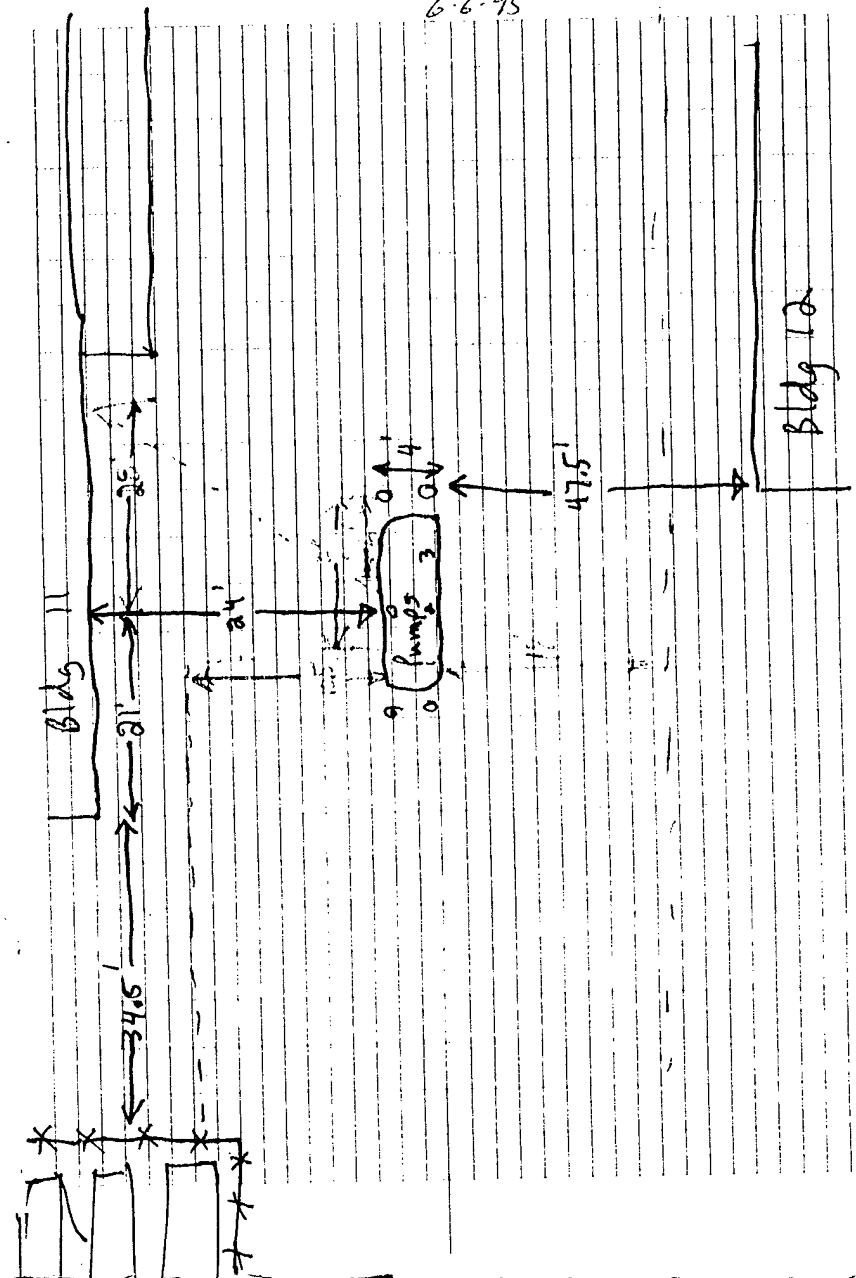
6-6-95

1345 Met Gtn Punt at Area 13
Discussed which site to start at for tomorrow - decided on Area 13
He stated that he would like a meeting with us, subcontractors and Fire and Security from Base for briefing tomorrow AM. He would check into the time availability for the meeting. He was going back to Area 12 for utilities clearance and then back to his office.
We decided that Area 12 would be best to work on from Fri thru Mon because they were "No Fly Days".
When working on Area 13 we were requested to work on the East or West side one at a time so that there would be the availability of the Pumps to the base vehicles. Martha Cramer and I set out a grid around the pumps at 20 foot intervals to give a reference point for sample locations tomorrow. The first Row east of the pumps is too close to the storm sewer line and will need to be moved further west also the electrical line from the

6 6-6-95

Building 11 to the pumps will probably need to be relocated - the reference point for measuring the grid was the brass plate in the island on the west side of the middle pump. Stopped by to talk to Captn Punt and set up a time of 11 AM for a meeting with Base Security and Fire Dept for Briefing
left base about 330 PM
Weather Hot and Humid

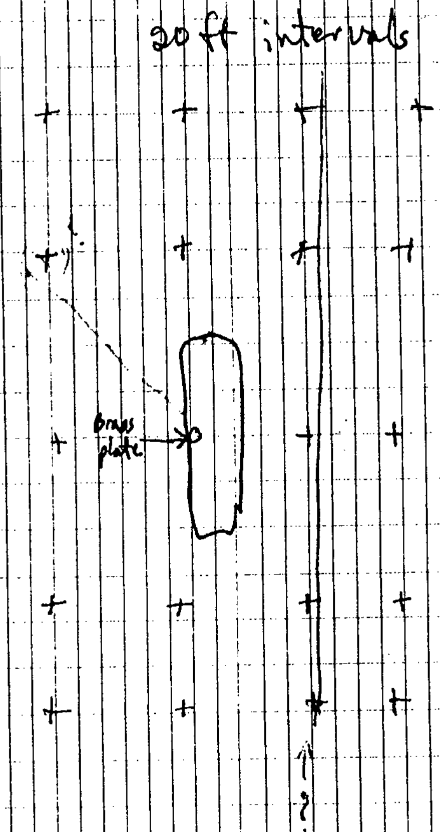
6-6-95 7



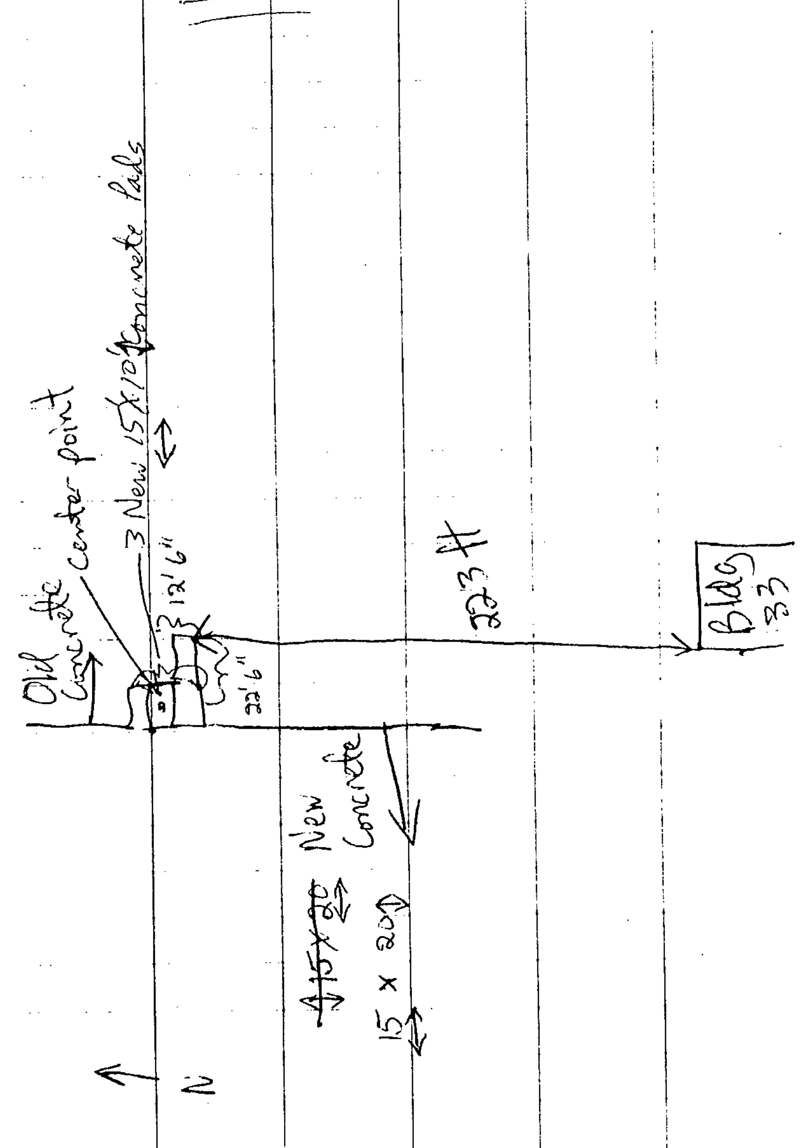
8

6-6-95

9



Area 12



6-7

0730 Met Target in front of Motel David Sterling said that they will not have VOA vials but will get them tomorrow thru Priority shipping. Proceeded to Base for 8AM Health and Safety Briefing

0805 Site Specific H&S Briefing given - Outline of topics discussed is included in the HASP.

Attended by:

Brian George

David Sterling

Jeffrey E. Filkins

Peter J. Ferron

Given by Martha Cramer

10:35 Proceeded to Areas 12 + 13 to look at sites. We put out traffic cones at Area 12. Proceeded to Area 13 and discussed work strategy for tomorrow +

will probably sample every other grid point (20ft intervals). Target needed to make phone calls for rental of rock drill. Meeting with Base Security and Fire Dept. is pushed back to 1 PM.

Discussed Sample analyses with Target - Question on Work Plan's discussion of SOV sampling also states that GW samples (20) and when these samples will be taken.

1300 Meeting with Mike Hangen Base Fire Dept

EMS 9-911

Welding Permit Each Day

15 mph ON Base

5 mph By Airplanes

Slow on Ramp.

Restricted Area need Escort

Red lined Area

* list of People

Hours

Vehicles - license plate # + Marking on side

FOD - Mud Dirt Rocks

Wear seat belts

Proof of Insurance in Vehicle

0 = Main Gate Base Phone - Variations in Hours

Weather Cloudy Cooler

Completed Meeting

Discussed FAX from Patel Re: # of GW Sample at Area 13

Provided list of people Vehicles etc to Captain Pant

Checked Receipt of Supplies

Found HNU was shipped to Dublin OH

↳ will be shipped overnight to SDANG

Joe Fass.

1500 Proceeded to Ramp Area 12 to set up Grid

1630 Left Base

6-8-95

0750 Met Captain Punt and Target Dave Sterling
Dave unloaded bentonite and some supplies into
SPANG Bldg 47 Garage area. Capt. Punt and I
moved traffic cones for the week on Ramp for
setting up grid Area
0820 Martha Cramer and I proceeded to Ramp to
set up 50 foot interval spacing grid
0910 Dave came to tell us that HNU and bottles
came in
0930 Completed calibration and head into the field
Area 13
first hole [illegible] of the pumps got down to
about 10 feet and [illegible] came [illegible]
so they moved over [illegible] another hole [illegible]
estimated depth to water is 7 ft
Last interval filled with water and [illegible]
could not get sample
1040 Ran sample to Mobile Lab
Labeled SG 1-1 SAM-002
SG 1-2 "
SG 1-3 "
SG 1-4 "
1050 Back at Area 13
1055 Started SG 2 North of the Pump Island
they got down to 10 foot interval and [illegible]

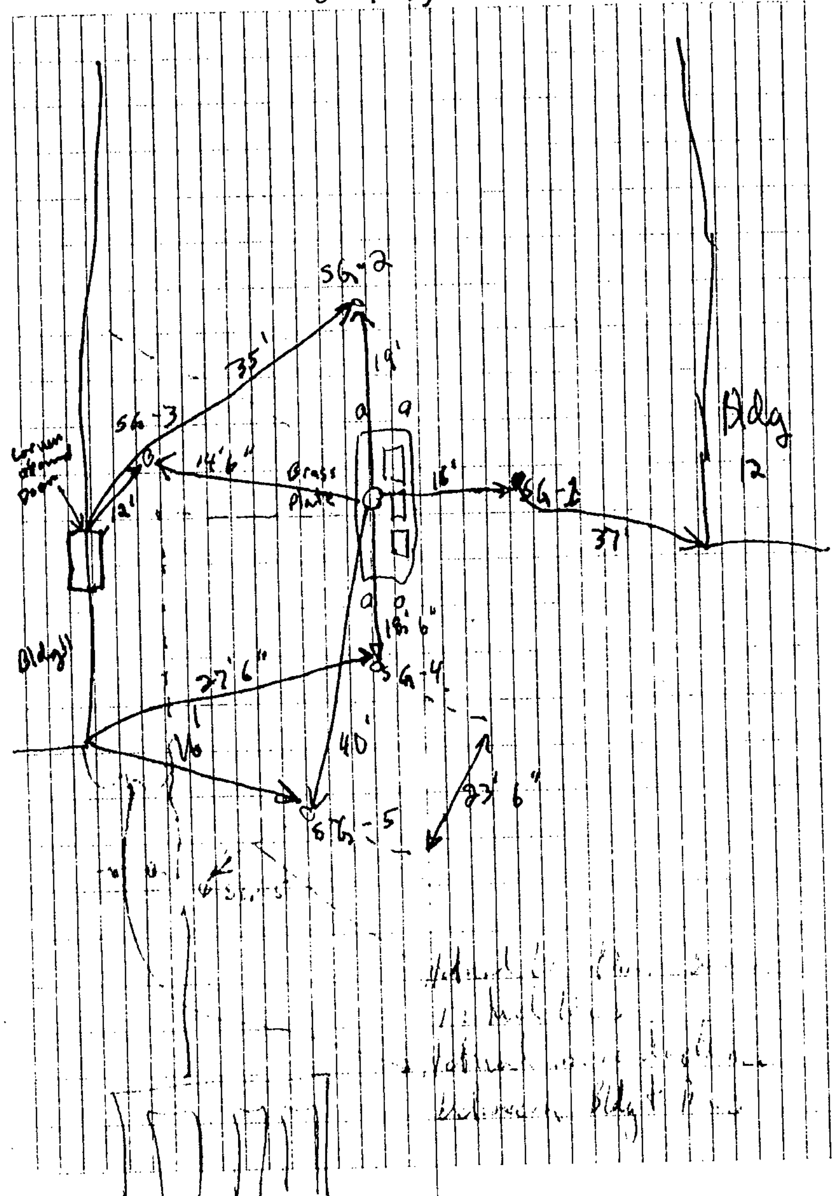
water came into the probe and a soil gas could not be obtained - four samples collected at 2 ft intervals

1130 set-up for SG-3 West of the pump island Completed 1200 And left for lunch - first to Bldg 47 - talked to Captain Plund and We left base for lunch at 1230 Arrived back on Base at 1330PM went to Area 13 and set up on next SOV hole SG4 at 1340 Jeff from the Mobile Lab said that there was slight "hit" on the samples from the first hole for "Methane". Methane he said could be a mixture of ethane, pentane, butane, and methane. The first hole at SG4 the tip slipped off the end of the rods so they moved over and started a new hole SG4 is on the ~~North~~ south side of the pump island

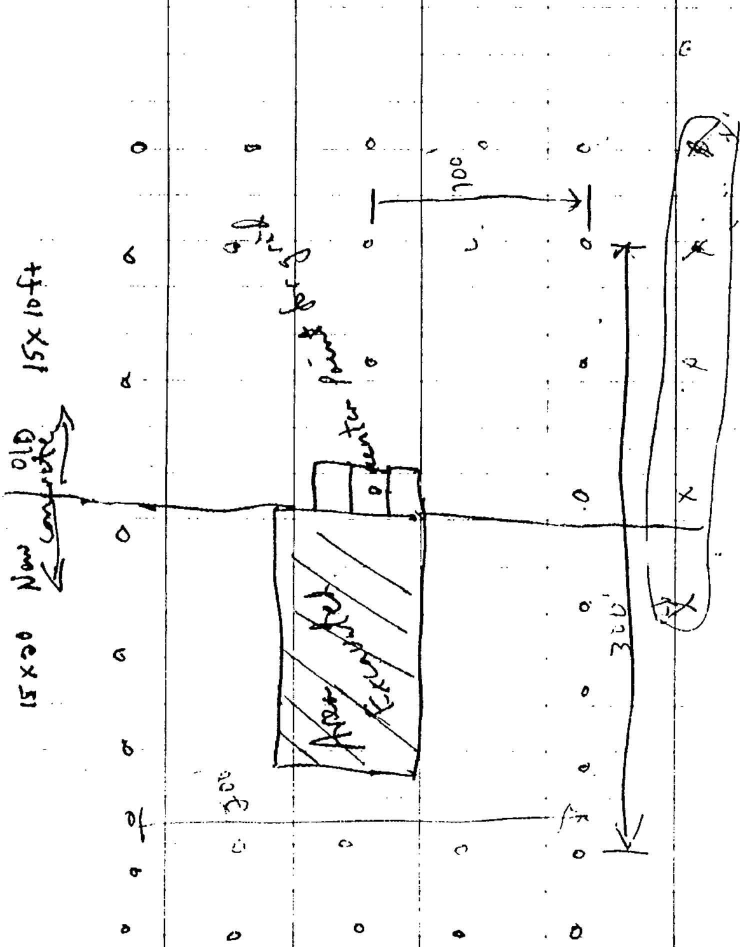
Raining

1415 started SG5
Completed SG5 and filled holes with Bentonite and proceeded back to Bldg 47 at 1355 Prior to filling hole HNU Readings were taken down the holes and readings were the same as background
intermittent light Rain throughout day

6-9-95



6-9-95



6-9-95

7:30 Arrived on Base Met Captain Punt and Dave Sterling and Brian from Target Notified Capt Punt that the screening results from Area 13 SOV samples were detecting "Methane" Martha and I went over to area 13 to get measurements of distances for SOV locations see map pg 17 proceeded back over to Area 12 to meet target at 8AM

0815 H&S briefing
- Safety Glasses
- Thunderstorms

[illegible]

Pete [illegible]

0825 Started hole in concrete
Talked to Patel at Capt Punt office
Hayley Jamie Wilkens 301 9 36 8709
FAX 8121
Talked to Capt Punt about Saw on grid line South of grid line discussed yesterday by mistake Put 5 holes thru concrete on grid

6-9-95 SG 12-1

line South of (56') line 100 ft Southside of excavated Area 12

Started Sampling ~1005

Planes on Ramp to NE of Sampling Area

Weather light Rain intermittent Windy about 50's F

SG 12-1 at 8ft depth water was taken into line when sampler was pulled

1025 Ran Sampler from SG 12-1 to Mob Lab

10:28 Returned to Area 12

10:30 Took first Sample at SG 12-2

1055 Started Next soil Gas hole SG 12-3

Hit water in ~~SG~~ SG 12-2 at 8ft so we decided to go to 6ft on the next hole SG 12-3 and the following hole SG 12-4 to 8ft to see if it remains consistent that water is at 8ft. Martha & I took Samples to Mob Lab

11:20 Started SG 12-4 Rain stopped

finished Sampling at 11:45 and decided to clean up and break for lunch

Left Base at 1150 for lunch

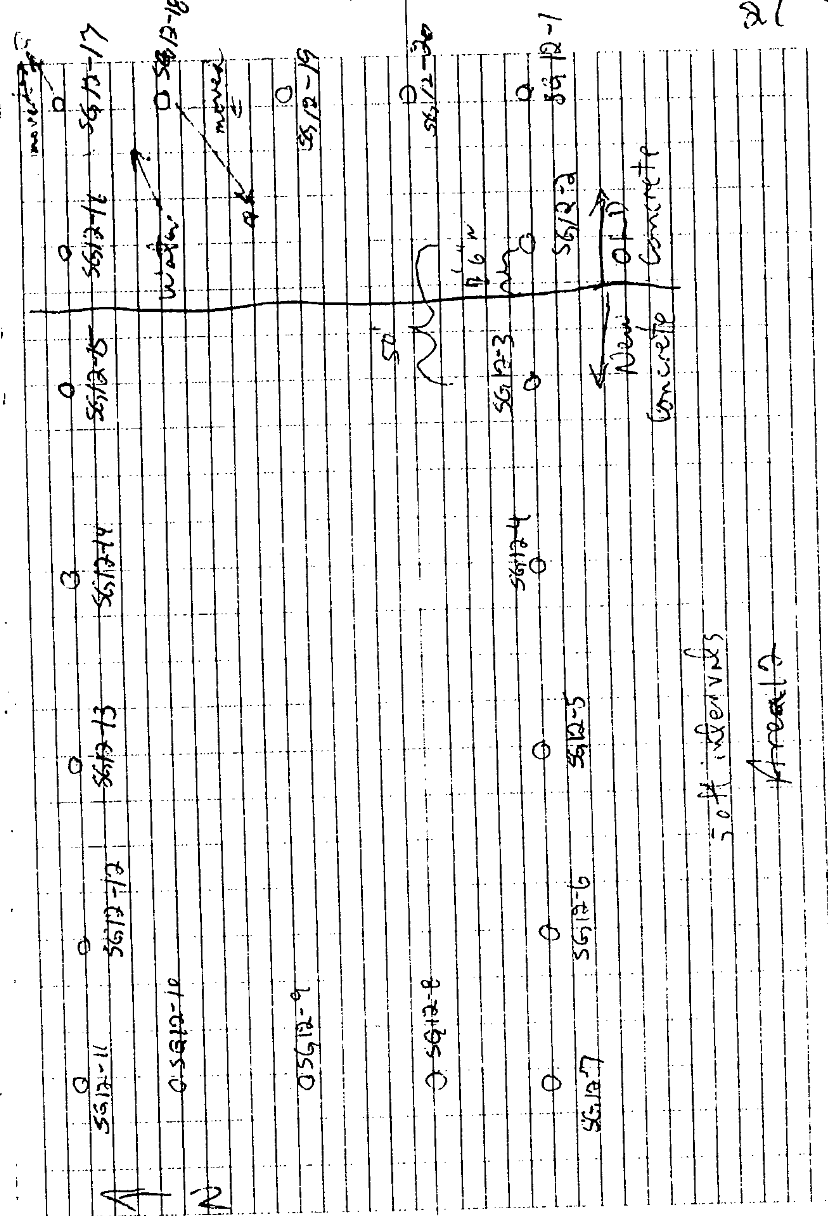
1245 Arrived Back on Base at area 12 Started SG 12-5

Completed hole at 1305 – down to 6ft

1310 Started at SG 12-6 Completed at 1330 – Truck Van needed Jump start

1345 Started at SG 12-7 down to 6ft

Cored thru Concrete and started Soil Gas at 1430



6-9-95

1430 started SDV at SG12-11
1445 Completed SDV at SG12-11
Started Raining hard at 1440
Dave said that it was raining too much to continue so we decided to wait a half hour to see if the rain lets up some
1450 Got Back to Bldg 47 (Civil Engineering Bldg)
1530 the Rain did not let up so we decided to stop for the day

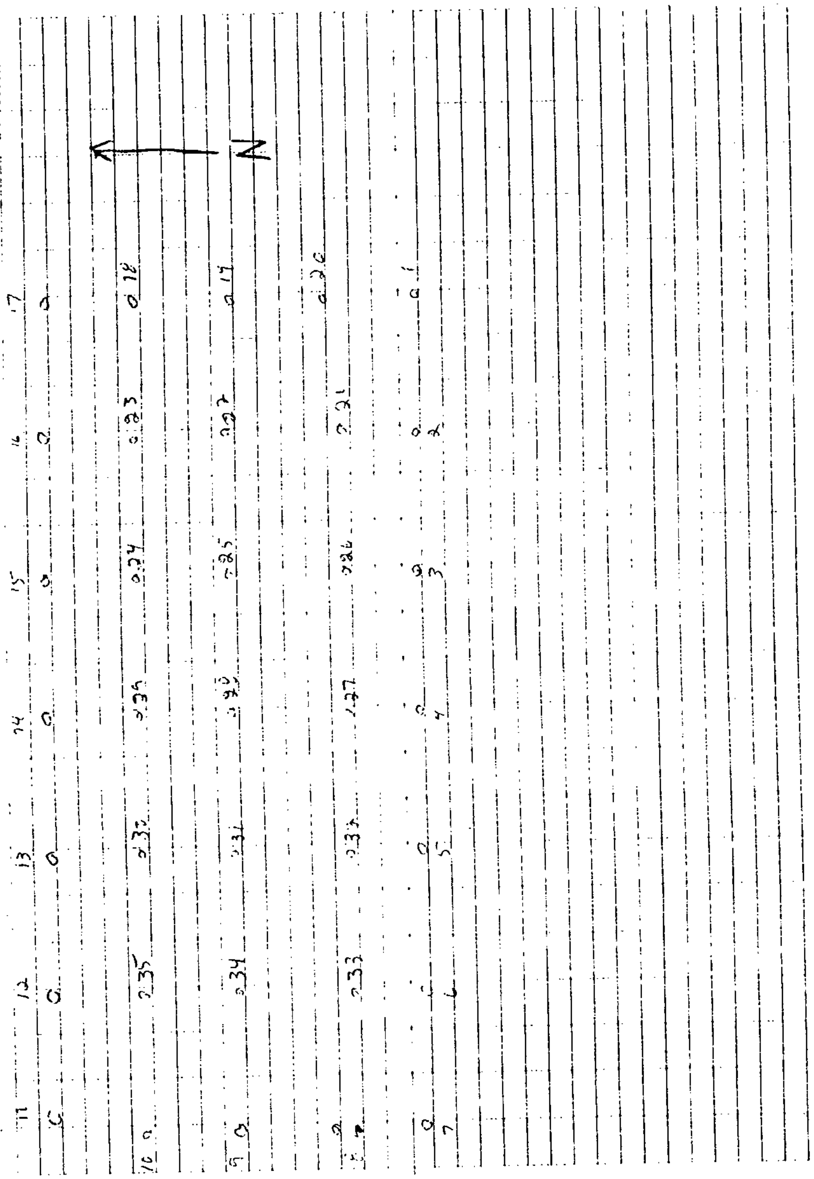
6-10-95

0730 Arrived on site at Bldg 47
Calibrated HNU
0735 H&S briefing: Topics discussed:
Hearing Protection
Vibration
Given by [signatures]

0750 set up on hole SG12-10 down to 6 ft
0810 completed SG-12-10 Martha + I took first samples to Mob Lab
0815 took first sample at SG12-9 down to 6 ft
0825 Completed sampling + Martha + I took samples to Mob Lab.
0830 Set-up on SG12-8 completed to 6 ft
0840 start Coring holes in concrete
finish Coring holes SG12-12 thru SG12-24
see map page 21
0930 Started Sampling at SG12-12 to 6 ft
0945 Started Sampling at SG12-13 to 6 ft
1010 Started Sampling at SG12-14 to 6 ft
1025 Started Sampling at SG12-15 to 6 ft
1045 Started Sampling at SG12-16 to 6 ft
Moved Sample locations SG12-17 and SG12-18

6 - 10 - 95

to the NE and SW to give a 20 foot
Clearance for the Water line - Drilled
2 more holes in Concrete
Set up on SG12-17 at 11:20
Completed Sampling at 11:45 headed back
to Mob Lab
1200 Broke for lunch
1300 Arrived back at Mob Lab
No new "hits" ~~on~~ samples
Proceeded to Area 12 set up grid on interior
of the perimeter Numbering locations
in a "s" fashion from 21 thru 35 see
page 25
1320 completed sampling at SG12-19 to 6 ft
when pulling up, the SOV rods a
hydrocarbon smell was noted the HNU
was placed over the hole when the
rods were pulled and measured 50 ppm
(Calibrated to benzene)
1325 SG12-20 sampled down to 6 ft
HNU Reading = Same as background ppm
Drilled holes thru concrete for 21 thru 27
Completed Sampling at SG12-21 at 1430 to 6 ft
1500 Completed SG12-22 to 6 ft
1510 Started SG12-23 to 6 ft



6-10-95

1530 Started Sampling SG12-24 to 6ft

1550 started sampling SG12 25 to 6ft

1610 Completed Sampling at SG12-25 and headed back to Mob. Lab. This was all the samples that the Lab Could handle today.

1630 After hooking up recharger to HNU and talking to Jeff in Mob Lab we left the base Martha & I relayed Samples to the Mobile lab throughout the day

Ambient temperature ranged from low to high 40's Wind direction from NW to NE

6-11-95 Sunny No Clouds

Arrived at Base at 0730 Calibrated HNU and Spoke with Jeff about Lab Results from Yesterday only Hit was at location 19 Spoke with Captain Hunt (called at home) informed him of the hit on the east side of perimeter in the middle and that we were going to continue to fill in the grid and around hits

0810 Safety Briefing Topic Emergency Procedures Grumbly [signature] [signature]

0810 After safety briefing started SG26 down to 6ft

0820 Started SG27 down to 6ft

0830 Completed SG27

0835 Started Coring holes thru concrete SG28

0905 Completed ~~sor~~ concrete coring thru SG35

0910 Started Sampling at SG28 to 6ft

0930 Set-up on SG29 down to 6ft

0945 Started Sampling at SG30 down to 6ft

1010 Started Sampling at SG31 down to 6ft

1035 Started Sampling at SG32 down to 6ft

1100 Started Sampling at SG33 down to 6ft

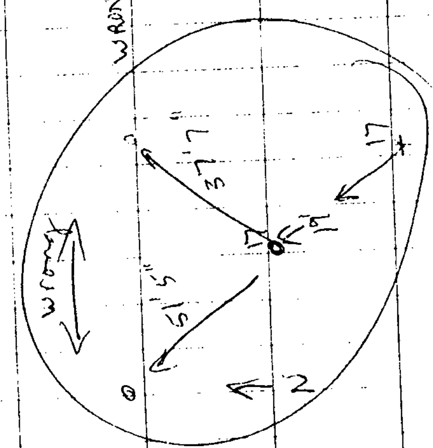
Martha & I Marked SG36 thru SG41 around SG19

1115 Started Sampling at SG34 down to 6ft

6-11-95

1130 started Sampling SV35 down to 6 ft
1140 completed Sampling and headed to Mobl Lab
No more hits - head out for lunch
at 1200

WRONG Direction
see page 31



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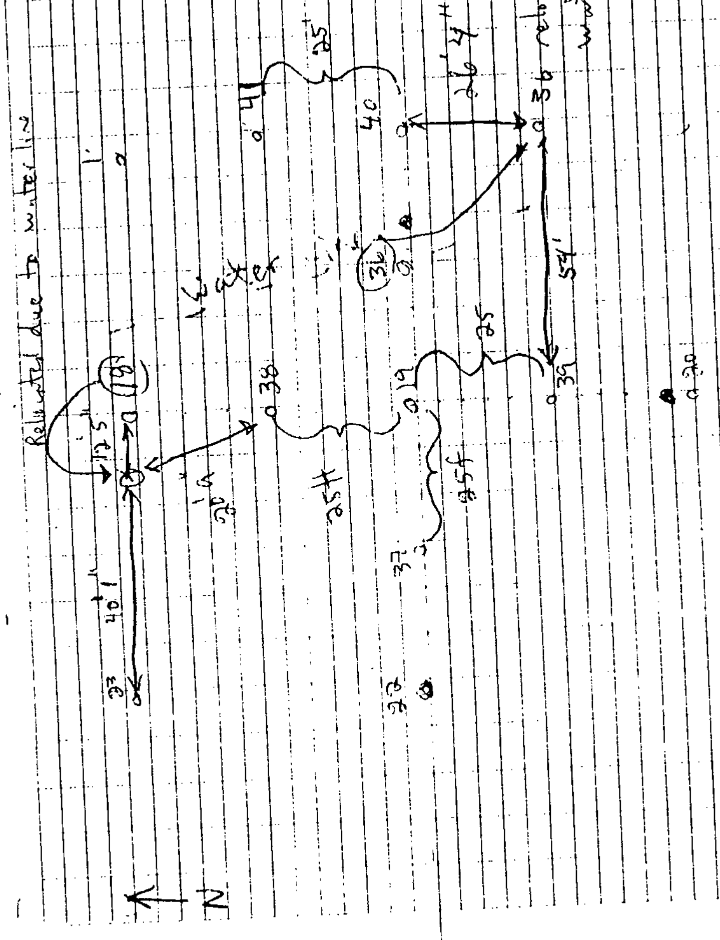


6-11-95

1300 Met Jeff at Mob Lab
No more hits - he has just run SG34
and about to start SG35

1315 Started Concrete drilling around
SG19 Grid Points 36 thru 41

1330 Started Sampling at SG36 to 6ft

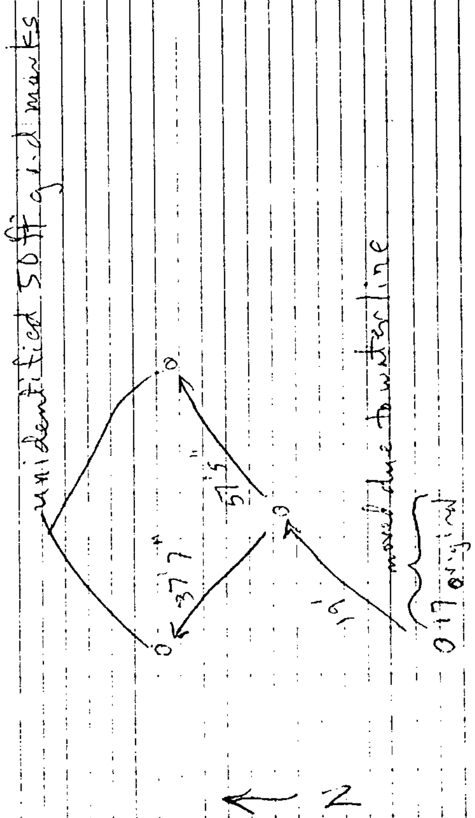
1340 Started Sampling at SG40 to 6ft

1415 Started Sampling at SG41 to 6ft

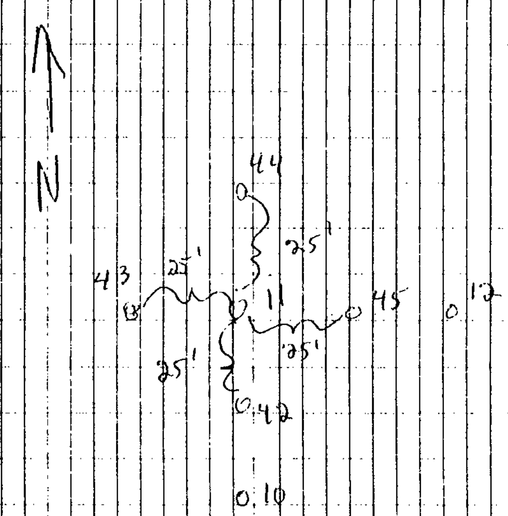
1430 Started Sampling at SG38 to 6ft

1450 Started Sampling at SG39 to 6ft

1530 Completed Sampling at SG37 to 6ft



1530 to 1555 Cored SG 42 thru SG 45 thru
Concrete
1600 Started sampling of SG44
1630 Completed SG 44 to 6ft and headed
Back to the Mobile Lab decided to
Stop sampling for the day
1645 left Base



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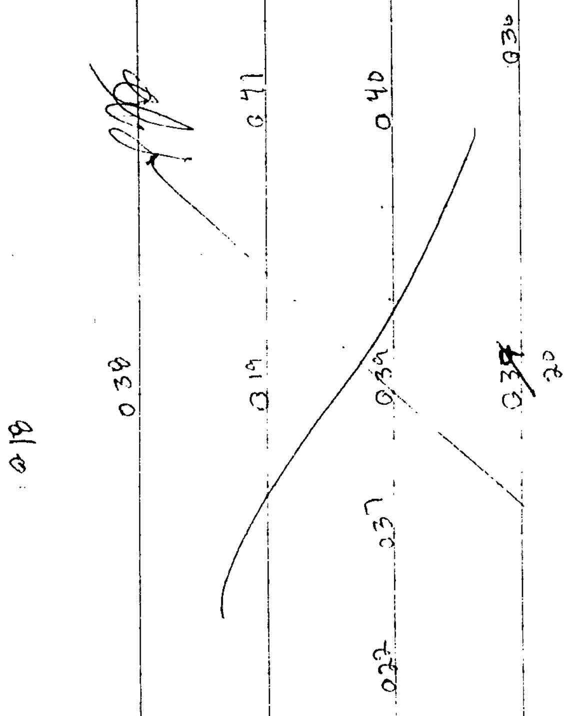
6-12-95



35

6-12-95

0730 Made Numerous Phone Calls Regarding
Purchase orders
0750 Went to lab to get Cooler and talk about
getting pH, Conductivity and Trip Blanks
0815 Went to Base Made some more phone calls
regarding Purchasing and Trip Blanks
Jeff from Mob lab Said that It would Take
a few hours to set up for soil analysis
I told him that We expect to finish about lump
0945 H&S Briefing
Topic discussed: Heat Stress
Given by: [illegible]

[illegible]

0950 Started Sampling at SG 12-43
SG 12-42 was completed by target prior
to 0950 - Martha and I were setting
up more grid point around points
19 and 37
1020 Completed SG 12-45 down to 6 ft
Sunny No clouds
Martha and I added SG 12-46 thru SG 12-52
around Grid Point SG 12-19 and SG 12-37
see map page 37

36 6-12-95

1030 Target Completed drilling holes thru concrete for SG 46 thru SG 50

1040 Started Sampling at SG 48 to 6 ft
Finished Sampling at SG 48 and the HNU reading down the hole was 7 ppm

1055 Started Sampling at SG 47 to 6 ft
HNU Reading down hole 6 ppm SG 47

1115 Started Sampling at SG 50 to 6 ft
HNU Reading downhole 4 ppm SG 50

1130 Start sampling at SG 46 to 6 ft HNU 0 ppm

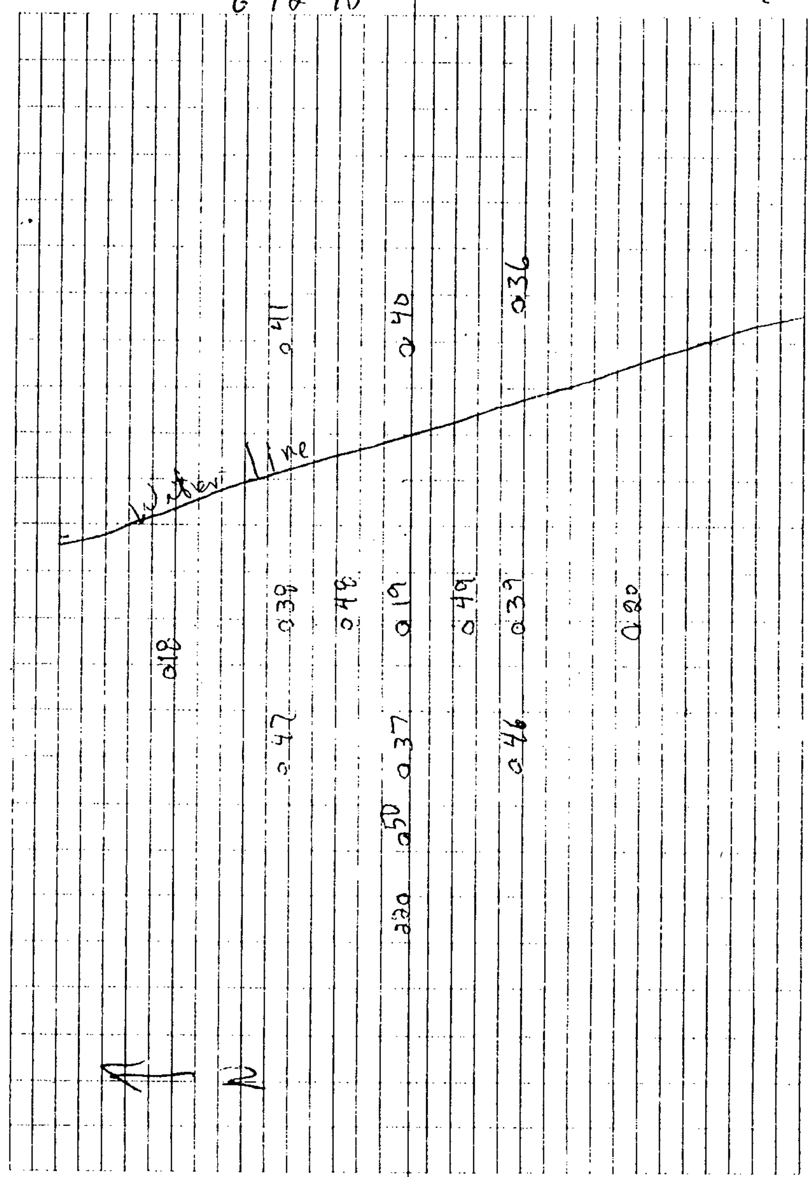
1200 Completed SG 49 HNU <1 ppm Went to Mob. Lab. Discussed approach to Soil sampling - Target was under the impression that only 2 samples would be taken and not continuous sampling

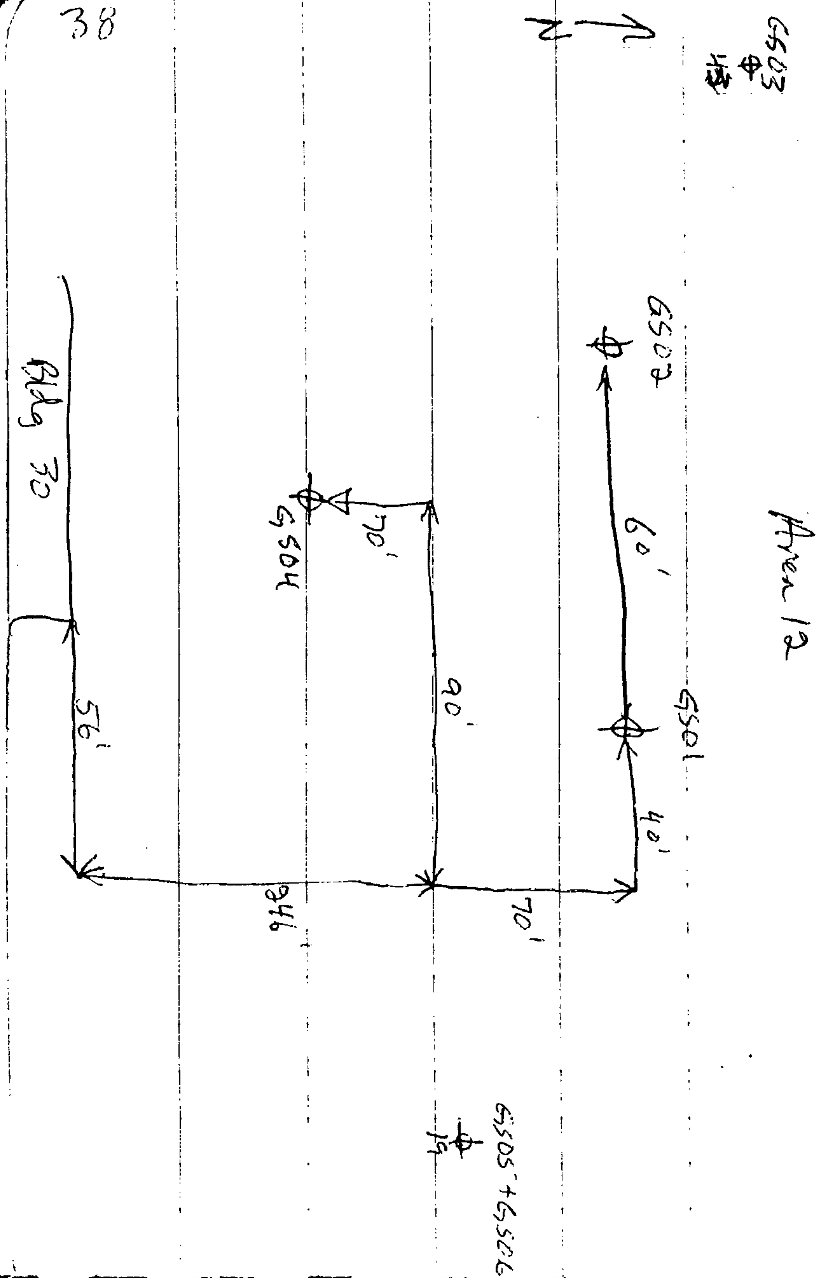
1230 Went to lunch

1330 Prepared Bottles
Mobile Lab Needs the Rest of day to finish Soil Gas samples and switch over to screening soils for tomorrow
Need Sample Results to determine Geoprobe Soil Sample locations

1530 Leave Base

6-12-95 37





6-13-95

0720 Talked to Alan Klavan about Geoprobe locations on Ramp Area 12 - decided on four locations with a posibility of Expanding to six two in hit areas two just N of Excavated Areas

0845 Arrived on Base discussed with Captain Point sample locations and after talking with the state "EPA" DNR decided to take an addition
Marked the locations
Went to get Ice
Took Equipment Blanks see pages 40+41

1115 Set up on First Geoprobe site and took first sample two holes need to be put through the concrete to obtain sufficient Volume for analysis
one sample will go to two BTEX bottles for off-site Lab and the second will go to the onsite lab sample and TPH offsite sample bottle
Sunny Partly cloudy Windy from South
Ambient Temp ~ 80
loging of sample in other log book

6-13-95

Duplicate 1905 GS06-1 2-4 ft → of → 1810
Duplicate 1915 GS06-2 4-6 ft → of → 1830

6-17-95

Time	Sample			
1040	EB01	Geoprobe	Soil	Equipment Blank
1040	EB02	Geoprobe	Water	Equipment Blank
1115	GS01-1	Geoprobe	Soil	2-4 ft
1145	GS01-2	Geoprobe	Soil	4-6 ft
1205	GS01-3	Geoprobe	Soil	6-8 ft
	→ Hit water at 8 ft			
0900	TB01	Trip Blank		
0800	TB02	Trip Blank		
1340	FB01	Field Blank	Potable Water	
1345	FB02	Field Blank	ASTM Type II Water	
1425	GS02-1	Geoprobe	Soil	2-4 ft
1430	GS02-2	"	"	4-6 ft
1445	GS02-3	"	"	6-8 ft hit water
1520	GS03-1	"	"	2-4 ft
1535	GS03-2	"	"	4-6 ft
1550	GS03-3	"	"	6-8 ft hit water
1600	Went back to decon			
1615	Target went to check into new motel			
1717	GS04-1	Geoprobe	Soil	2-4 ft
1727	GS04-2	"	"	4-6
~~1731~~ 1740	GS04-3	"	"	6-8 hit water
1810	GS05-1	"	"	2-4
1830	GS05-2	"	"	4-6
1840	GS05-3	"	"	6-8 hit water
1855	Completed Sampling headed to Mob Lab			

6-13-95

Iced the samples some more
Hooked up 4NU
Discussed sampling approach for tomorrow morning decided to start GW sampling In area 13 for screening samples left site at 1945

6-14-95

0730 picked up some cones from Ramp
went to Area 13 to set up a grid
see page 45 - Also picked a soil gas
location Between posts Sunny little wind
0805 H&S Briefing:
Topic Discussed PPE Requirements & [illegible]
Given by [illegible]
Attended by:
[illegible signatures]

0815 Sample take for Soil Gas at SG 13-6 at 2 foot
0820 " " " 4 foot
0830 " " " 6 ft
0835 PVC screen put in GW 13-1
0845 " " GW 13-2
0855 " " GW 13-3
0915 " " GW 13-4
1045 Delivered Samples to Lab Collected 6-13
1100 Arrived Back on site
Made some phone calls ~~Dre~~
Drew a few Maps Regarding Area 13 Locations
1230 Went to lunch

44 6-14-95

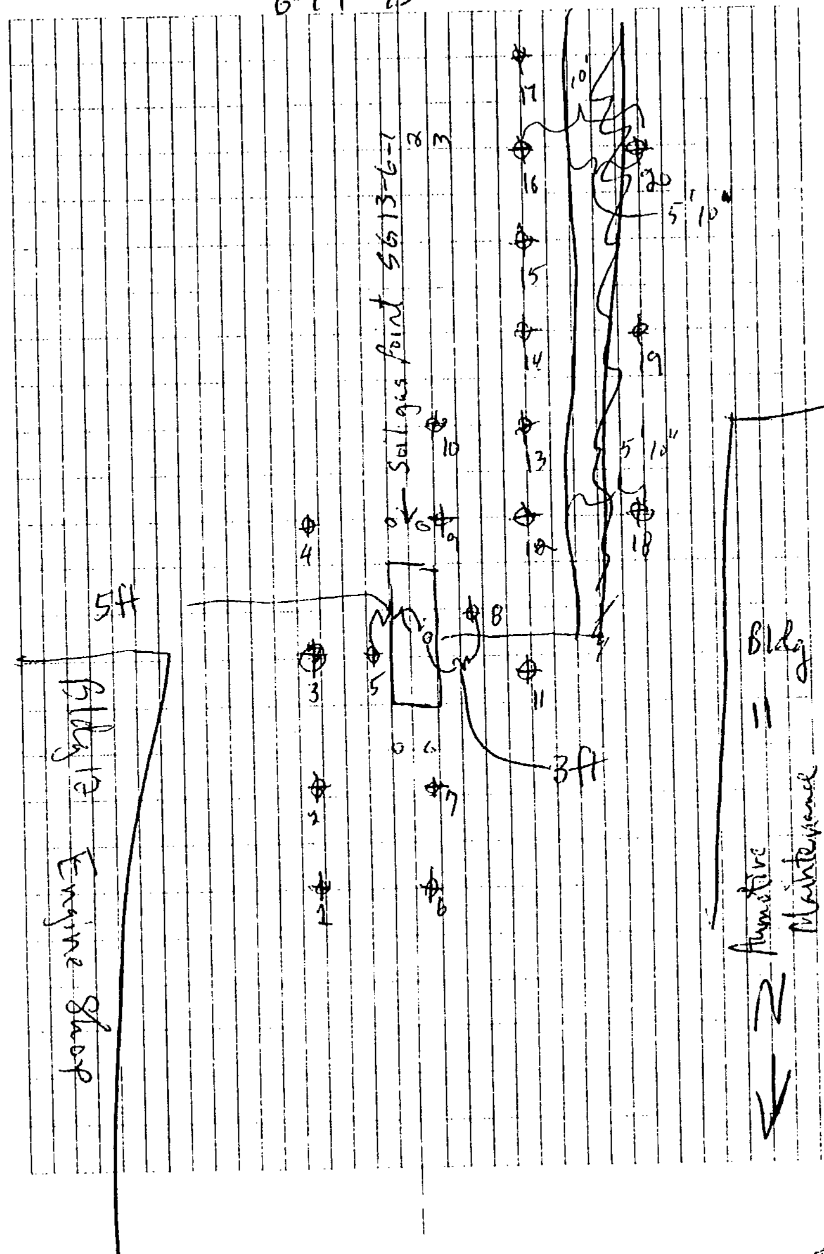
1320 Back from Lunch
Talked to Alan Klavans about the depth of the soil Samples in Area 13
He said to go to groundwater but Not than to 20' BLS
Talked to Lab About More soil Sample bottles for Area 13
Picked-up Bottles at lab
Went Back to Area 13 to see how the Target are coming with the samples for screening

1700 Decided to let three holes sit overnight to see it produce any more water for analysis

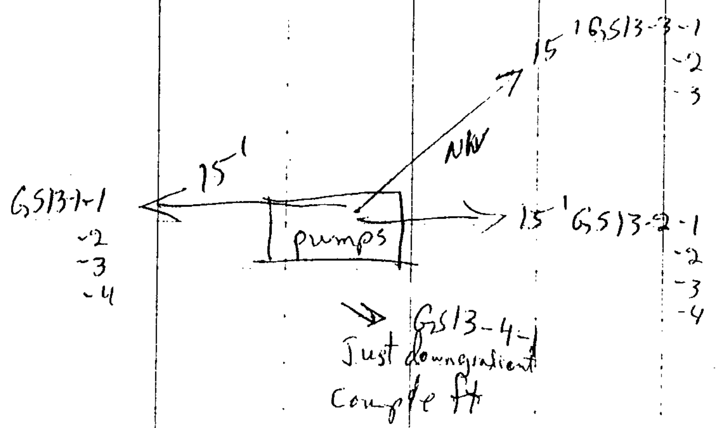
1730 Talked to Jeff in Mobile Lab about quantity of sample for analysis for the three groundwater samples that have low production (11, 12, 15)
The ones with two VOA vials will be sufficient for analysis and #12 will have enough for BTEX and Solvent screen - but not TPH we decided it is not worth going back to in the Morning - #10 was missed - will get it still

1745 left Base

6-14-95 45



6 15-95



down to water Table
2ft intervals

N →

6-15-95

0730 Arrived on Base talked to Jeff (Mob Lab) - Was not able to do TPH on GW Samples Area 13, Target - Sampled last GW Area 13 3 points had BTEX hits Area 13 all right around the pumps. Faxed diagrams to Alan Klavans (and Talked to Alan and Pat about progress) discussed soil sample locations for geoprobe in Area 13.
Alan called back after recieving FAX and decided on location as on page 46 15' North, South, and North West and one jus a couple of feet away from point where there was a hit

0830 H&S Briefing:
Topics: Severe Weather
Safety Glasses
Given by: Martha E. Crane
Attended by:

Took Martha out to Area 13

6 · 1 · 95

0945 SETTING UP ON GW05 to take Groundwater Samples
1000 CALIBRATE HYDAC.
1017 Drilled to 12 feet, Screens Set at 10' to 12' BLS.
1024 BEGIN SAMPLING GW05 AND GW46. GW46 IS A DUPLICATE SAMPLE OF GW05.
1112 Finished Sampling GW05
Final Readings: TEMP: 74.6 °F
pH: 6.70
COND: 12.01 X 100 μS/cm
1145 Equipment Blank Taken on ground water sampler 1205 go to lunch
1300 Equipment Blank Taken for Soils at Area 13
1310 Area 13 Set-up for soil Sampling
Windy Partly Sunny Windy See Map Page 46
1330 Geoprobe Soil 1–3' depth S of Pumps
few drops of Rain GS13-1-1
had to Make 3 holes to get sufficient sample
1350 GS13-1-2 3–5 ft
1400 GS13-1-3 5-7'
1410 GS13-1-4 7-9' water
TB03 Trip Blanks for Solvents and BTEX

6 · 15 · 95

1450 GS13-2-1 1–3' N of Pumps
1505 GS13-2-2 3-5'
1515 GS13-2-3 5-7'
1540 GS13-2-4 7-9' water @ 8.9 ft BLS
1622 GS13-3-1 1-3' NW of Pumps
1640 GS13-3-2 3-5'
1700 GS13-3-3 5-7'
1720 GS13-3-4 7-9' water
1750 GS13-4-1 1-3' Area 3
1800 GS13-4-2 3-5'
↳ Duplicate GS13-4-5 9-11' 18:40
1810 GS13-4-3 5-7'
1820 GS13-4-4 7-9' hit water
1845 After Cleaning up left base

6-16-95

0730 Arrived on Base Sunny Windy
0740 Target Arrived said they had to Return Rock drill and would be back in 1/2 hour
0745 Met with Captain Punt and updated him on Area 13 and GW Sampling Area 12
Packed up supplies in storage
0835 Target Arrived Back on site
0840 PF leaves for Huntington LAB to take samples.
0842 Setting up to Install "well" at GW01.
0900 Begin sampling GW01
Screen is set from 10' to 12' BLS
0850 dropped off samples collected yesterday at Huntingdon Labs and the HNU
GW01 72.9°F 6.07x100 uS/cm 7.40 pH
finished sampling at 0900
0915 Arrived back on Base
0950 setup to install well at GW02
0955 Start Sampling screen set from 10' to 12' BLS
1020 Finished Sampling
Temp 76.3°F 7.20 x 100 uS/cm pH 7.38
Conductivity

6-16-95

1040 Setup on GW 12-03 Screen set at 10'-12' BLS
0900 TB04 Trip Blank for BTEX
CB-5 Cooler Blank for Temperature
1045 Started Sampling at GW 12-03
1100 Completed Sampling
Temp 76.6°F Conductivity 4.69 mS/cm 7.92 pH
1120 Setup on GW 12-04
Screen Set 10'-12' BLS
1125 Started Sampling GW 12-04
Temp 74.2°F Conductivity 1.00 x 100 mS/cm pH 7.29
Completed Sampling 1145
1215 Went to lunch
Repackaged Samples
Prepared Fed Ex Shipment - Hazco
Talked to Captain Punt Regarding patching of the Lamp and Area 13
He would check to see if it was to his satisfaction
I talked to the Target + told them that they were not to leave until Captain Punt was satisfied with the patching
1420 Dropped off samples at ~~Fed~~ to the lab (Huntingdon) and then to Fed Ex
Martha dropped me off at the Airport to 1430 catch 430 flight. Martha was going back to Base to check on the progress of the patching by Target

7-10-95

Arrived on Base at about 1300 met with Captain Punt to find out how things were progressing as far as clearances. He said that he had not made the call yet, was just going to.
We discussed Condition of Decon pad, water supply, drum staging, and Equipment staging area,
Checked through Equip. and Bottle supply
Called - Virginia at Huntingdon Labs
Re: More Coolers, Excess bottles, Trip Blanks, # of Bottles Required per sample, COC Seals

Made Numerous Phone Calls Regarding Rental of Truck and Generator
Weather Sunny Hot
Called Jim NW Concrete 529-5700 - Re: Start of Concrete Drilling and # of holes He thought 14 I referred him to Pat
Capt Punt Raised Question of specifications of the cast Iron flush mount Cap for the Wells and last Requirements that had to be met for Caps on the Ramp. He feels Need for special Order.

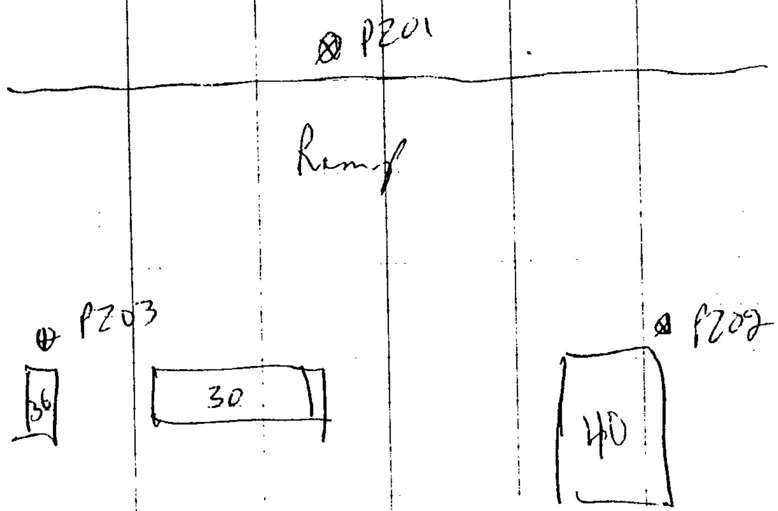
[signature] 7-10-95

7-10-95

Previous Caps from Municipal Casting Inc.
Madison, MN, (612) 598-75-47, FAX# (612)
598-7622 - wheel Load 58,000#s, 504, 504A
casting

Marked ~~Well~~ PZ Locations for Piezometers
with Captain Punt

left Base at 530 Pm



7-10-95

7-11-95

0800 T. Bagg + P. Ferron Arrive on site (Base)
gate Bldg 47 - work on Safety Briefing
etc. Called Vickie for PRO.
Talked to Pat. Plan to leave wells or
Ramp open untill get the right
flush Mount casings and have them
installed at a Later date. Captain
Punt said Utilities will probably be
cleared for the one North of the ramp
this afternoon

0930 Called Layne Western Re: Where are drillers
Was told that they were to call the office at
at 10 AM He had expected that they were already
on site

Labeled Bottles for GW

Hazco - Honda generator 5000 EB 2500
Converter **Spec** 230 Volt
Volt Single phase ± 10%
50-60 HZ ± 2%
Max Current 10 AMPS

115 Volt
Single Phase 115 ± 10%
50-60 HZ ± 2%
Max Current 16 AMPS

1130 Drillers Arrive on site

Pete Ferron 7-11-95

01330 Health and Safety Briefing - Site Specific with Drillers and Tracy Bugg given by Pete Ferron completed 0220 pm
Health and Safety Training and Requested OSHA Documentation and
Berm up the Decon area and patch the hole in plastic
1430 Recieved OSHA Doc. in part (Need 40hr documentation)
1440 Received OSHA Doc for 40 hrs
1450 Proceeded out to Site after Discussing Geotech Samples with Pat - Responsibility of Layne Western to take Samples and Analize and provide bottles - Will use Shelby tubes from 6 to 8 feet
HNu - 0 ppm Background
1505 Setup on site of PZ01
1530 first split spoon (SS) from 0-2 ft 2" diam HNu 0 ppm
1540 2nd SS 2-4 ft
1545 3rd SS 4-6 ft midwater 6"
1550 3" diameter 6-8 ft Shelby Tube PZ01
1600 4th SS 8-10 ft 2" diam HNu 0 ppm
1607 5th 10-12 ft
1620 6th 12-14 ft
1625 7th SS 14-16 ft
1700 Start to put in the Piezometer

Pete Ferron 7-11-95

7-11-95

Truck mounted Hollow Stem Auger
Acker Drill Rig

One drum from PZ01 with soil Marked
Soil above and below water
Table Location PZ01
Start Date 7-11-95
Fill Date 7-11-95
Contract

Layne-Western Company, Inc.

Lyle Porter – Driller
Mark Leslie – Driller's helper

~~Oklahoma~~ Omaha, Nebraska (402) 451-2388
Kearney, Nebraska (308) 234-1914
Sunny Very hot

[signature] 7-11-95

7-11-95

They had to redrill to 15' to get well in they lost
their plug at the end (bottom) of first Auger)
1710 finished Sanding up
1720 finished Bentonite Seal
1725 finished Bentonite Grout
Sanded up to 1 foot above screen
screen 1 foot above water table
because so shallow that there would not
be room for bentonite seal and grout
(otherwise would have just bentonite
seal to surface)
1735 loaded up equipment
1745 headed back to Bldg 47
1800 Left base

7 SS
1 Shelby
Drilled 15'

1 Bucket of Bentonite
10 feet screen
5 ft riser

[signature] 7-11-95

7-12-95

0700 Arrived on site at Bldg 47
Drillers needed to change hose on water tank

		HNU
0800	Set up on PZ02	
0810	started first SS on PZ02 Background	0 ppm
	0-2' 2" diameter low recovery	0 ppm
0820	2nd SS at 4-6' low recovery	0 ppm
08:30	3rd SS at 6-8' water at 7'	0 ppm
0835	4th SS at 10-12'	0 ppm
08:45	5th SS at 14-16'	0 ppm
1030	finished piezometer PZ02	

1 Drum of Soil above/below watertable

PZ02: Start: 7-12-95
Fill: 7-12-95

Drilled to 16'
4 bags Sand
10 ft screen 5 ft raiser
1 bucket Bentonite Pellets
only one foot of Sand above screen

Sunny very hot
Health + Safety Briefing - wear safety glasses, if breaks need from heat - take when needed

[signature] 7-12-95

7-12-95

1200 set-up on P203 NW of Bldg 36
1205 Started Augering HNU Background 0 ppm
1230 first SS 4-6' 2' SS HNU 0 ppm
1240 2nd SS 6-8' 0 ppm
Hit Water at 7'
1247 3rd SS 10-12 0 ppm
1255 4th SS 14-16 0 ppm
1410 finished Putting in P203
5 bags of Sand
1 bucket of Grout
10 feet Screen
5 foot Riser
1 Drum Marked
Soil above/below water table
P203
started: 7-12-95
Fill: 7-12-95
1425 left Site P203 went back to Bldg 47
Talked to Capt. Punt about Concreting the Caps on the Piezometers this afternoon and Clearance to go North of the Ramp
1510 left Base - left Note for Drillers at Gate about Time of Clearance North of Ramp

[signature] 7-12-95

7-13-95

1730 Met the drillers by Bldg 40
they were in the process of putting
a pad (concrete) around PZ02. They
said that they put a pad around
PZ01 yesterday afternoon and
because it was so hot after that
quit for the day. Will do PZ03
Next this AM.
Capt. Punt said He recieved phone
Call from Concrete covers yesterday
saying that they wont be in at 11AM
today and that they May not Make it to
the Base today at all - they need more
notice.
0925 PZ02 Water Level at 6.49'
0934 PZ01 Water level at 6.76'
0942 PZ03 Water level at 6.94'
Calculate GW Flow Direction to SW
Drew a Map & FAXed to Pat Patel
and Hayley-Jane Wihongi
Pat and I proposed 3 wells in Area 12
and one in 13.
After Much discussion we decided
on 3 wells in Area 12 and one in
Area 13

[signature] 7-13-95

7-13-95

the one in Area 13 No more than 20 30 feet away from where the contamination was found in the SW direction

Capt. Hunt obtained a drawing to scale upon which we would mark the proposed Monitoring Well locations for Area 12 and then FAX to Hayley.

The Concrete drillers notified us that they will not be on base until 10AM Tomorrow.

Sunny very hot

Health & Safety Briefing - take frequent breaks and Monitor heart Beat

Very hot >100°F wind from South few Clouds

[signature] 7-13-95

7-13-95

1600 Set up at MW 13-01 Just South of Pump Island

1610 Start Drilling through Asphalt 16" of Asphalt Subsed Rock Bit

1620 Start Drilling Past Asphalt using HSA HNU Background 0PPM

1622 Took 1st SS 4-6' 0" SS HNU 0ppm

1630 Took 2nd SS 8-10' 0ppm

Drillers Missed taking 6'-8' interval Split spoon and drilled past to 8' We had asked them to take 6-8'

1635 Took 3rd SS 10-12' hit water at 11'

HNU 0 ppm

HNU Downhole = 0PPM

1700 Took Shelby Tube 12'-14' for Geotechnical

1715 Took 4th SS HNU 4 ppm

1805 Trouble with sand bridging in the augers will bring up sand to 6' BLS checked the well with Water Level/interface probe found water at about 8 ft

1845 finish at site 13 except for grouting and cementing pad. loaded drum of soil on truck to take to Bldg 47

1900 left base

[signature] 7-13-95

7-14-95

0705 Arrived on Base. Met with Capt. Punt discussed location of Wells in Area 12 and Well in Middle of Contamination (Not in agreement with ANG policy per Hayley). Called Concrete drillers - will be out at 10 AM and drill 5 holes. Went out with Capt. Punt to Ramp to locate wells MW12-01 thru MW12-05. Went back to Bldg 47 at 0930. Capt Punt Would like us to work on the wells from West to East due to use of the Ramp.

1045 Went to lunch

1145 Met with Concrete Corer on Ramp. He said that drill was not cutting because it lost some (8 of 12) of the cutting segments on it and he would have to go back to the shop to put them back on

1530 Concrete Corer Back on base - Used Saw to cut holes (square) in MW12-01 and MW12-02. Completed by 1600. Told Drillers to start at MW12-01

1610 Drillers Setup on MW12-01

[signature] 7-14-95

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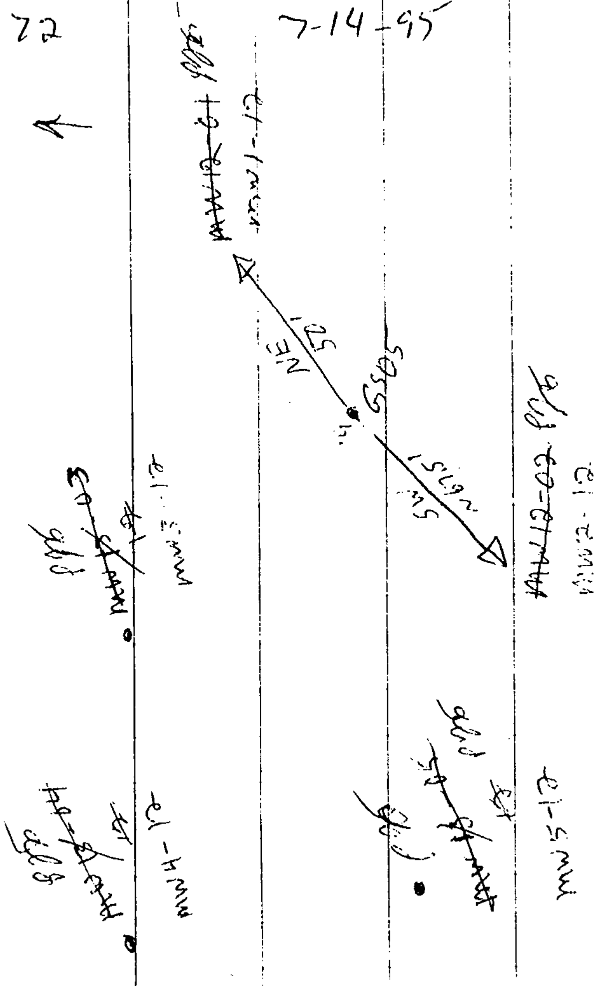
7-14-95



Health + Safety Briefing - use your hearing protection around aircraft and drill rig
Hot, Wind from South, Sunny

Pete [signature] 7-14-95

73

14-95

1639 Started Drilling   HNU Background ? PPM
1707 Took 1st SS 6-8'   ? diameter HNU 0 PPM
1715 Took 2nd SS 10-12'   0 PPM
Talk to Carrol [illegible] about casting will be about 2 wks - Layne will install them
1735 Took 3rd 14-16   ? diameter 7 PPM
1850 Left Area 13 after putting in MW-13-01 and pulling two cores at each open hole. Adkins
1900 Left Base Sunny all day, had started to get Cloudy
Geotechnical Sample taken at 14-16

Pete [signature] 7-14-95

7-15-95

0700 Met Drillers at Blg 47
Weather Cloudy Rained last night
Rain very light
0710 Set up on MW12-02
0720 Started drilling Background HNU 0ppm
0735 took 1st SS 6-8 2" diam 24ppm
0740 took 2nd SS 10-12 2" diam 0ppm
0755 took 3rd SS 14-16 2" diam 0ppm
0830 Went back to Bldg 47 to call Concrete Corers to find out when they will be out. No one answered left message on machine for Jim Brinkel(?) - Called Pat to update him on developments we plan to have the drillers develop wells if concrete holes are not cored
0900 Completed Well MW12-02 and Went back to Bldg 47 - 2 drums
0905 Concrete Corers called will be able to have hole cut by Noon and last hole ~~later~~ [illegible] shortly after.
0910 Drillers need to get Bentonite pellets
0945 Drillers leave to go to Sioux City to get pellets will be back about Noon
1530 Drillers arrive back at Base
1540 Set-up on MW12-04

[signature] 7-15-95

7-15-95

Health and Safety Briefing - wear nitrile gloves ~~for~~ so that chemicals are not absorbed thru skin

Pete [illegible] 7-15-95

7-15-95

1600 Take 1st spoon 6-8' 2" diam HNU 0 ppm
HNU Background 0 ppm
1605 Took 2nd splitspoon 10-12' 2" diam HNU 0 ppm
1625 Took 3rd SS 14'-16' 2" diameter HNU 0 ppm
Drilled to 16'
1635 Started Well Installation
1640 HNU in Well Augers 0 ppm
1710 Finish Well and Drillers went back to decon and drop off drums
1715 The Concrete Corer finished last hole and left Base
1740 Set-up in MW12-95
Was Very Cloudy at about 1700 but cleared up still cloudy but does not look like its going to storm Temperature 80's
1750 Started Drilling Background HNU 0 ppm
1805 Take 1st SS 6-8' 2" diameter HNU 0 ppm
1815 Took 2nd SS 10-12' 2" diameter HNU 0 ppm
1825 Took 3rd SS 14-16' 2" diameter HNU 0 ppm
Clouds Cleared up
1830 Start Installing Well
1910 finished Well and left to decon
1925 Set up on MW12-03
1930 started Drilling
A lot of gravel above first Split Spoon

Pete [illegible] 7-15-95

7-15-95

Geotech samples

	Depths
~~MW 0 ppm~~	
MW 12-01	14-16'
MW 12-02	6-8'
MW 12-03	10-12'
MW 12-04	6-8'
MW 12-05	6-8'
MW 13-01	12-14'

[signature] 7-15-95

7-15-95

2010 Took first SS at 10'-12' 2" diameter HNu 0ppm
HNU Background 0ppm 10-12' Geotech sample
The 6-8' interval SS was not taken because
of all the gravel
last auger flight came off string and
drillers had to fish out the last string
decided to call it day at 2055
2100 left Base

[signature] 7-15-95

7-16-95

0800 Arrive on Base Sunny Hazy fog
0805 start Drilling back down again MW12-03
0825 Drillers lost centr. Plug down the hole
0850 Took last split spoon at 14-16' interval
Background HNU 0 ppm
HNU reading 0 ppm
0900 Drilled down to 16 ft
1010 Completed MW12-03
1015 Grouted MW12-03
1030 " MW12-04
1040 " MW12-05
1045 " MW12-02
1050 " MW12-01
1100 Went Back to Building 47 Decon Pump
1120 Go to MW13-01
Water ~~H.Ts~~ level meter (since it is an interface probe) will only go down to bottom of the screen and will not measure [illegible]
1130 Water level taken 8.03 ft depth to water
1135 The Drillers are having difficulties with getting their Grundfos pump to work
1200 HNU Down hole = 0 PPM
66.7 °F Initial Reading at 1245
1760 µS/cm Conductivity
pH 6.25

Peter [illegible] 7-16-95

7-16-95

When Developing the Well the pump was located about 1-2 ft from the bottom of the Well and moved up and down to different levels and pumped untill clear and parameters become steady and then moved to another level and back down to the bottom of the Well and start over untill all parameters are steady

Health and Safety Briefing - wear eye protection against splash hazards

[illegible] 7-16-95

7-16-95

Boiled out about 1 gallon

Cannot get a water level during pumping due to the size of the interface probe

1330 finished Developing MW13-01

1340 Dumped Water down drain

Marked Grid Points and Geoprobe Sites at Areas 12 + 13

Area 12 - Geoprobe GS-01 thru GS-05

SOV - Marked V-1, ~~V-7~~, V-7, V-11, and V-17

Area 13 - Geoprobe Marked S-1 thru S-4

SOV (Water) Marked W-1, W-4, W-18, and W-20

1455 Left Base

[illegible] 7-16-95

7-17-95

0700 Arrived on site Bldg 47
0710 Setup for Well development on
Well MW12-01
HNU Reading 3PPM and then Came back down to 0ppm
0715 HNU No elevated Reading in area
around well or Development Water
or down Well
0720 I went Back to Bldg 47 to make
some phone calls & FAXs
0830 Back at MW12-01
0840 Well developed - Went back to get
Lyle
0845 Go Back to Bldg 47 for decon
0915 Set-up on MW12-02
HNU initial up to 45 ppm and
then came back down to 0 ppm
Pulled out about 15 gallons
0935 Started Pumping
1045 Recalibrate Cond Meter due to the
Temp dial being bumped
1115 Complete developing well
1130 Went to lunch
1200 Dumped Water and decon Pump
I made several phone calls
Tracy Went out and developed MW12-03

PBenn 7-17-95

7-17-95

Health + Safety Briefing - When moving drums watch out for pinch hazards (drum and truck hand in between)

[signature] 7-17-95

7-17-95

With Mark from Layne
Started at 1255 and Completed development at 1415 Dumped Water at 1430 and then Deconed Pump
1505 Started developing MW12-04
1630 finished developing MW 12-04
From 1515 to 1615 I was with Lyle back at Bldg 47 going over paperwork for drillers charges
1650 After dumping Dev. Water and Decon Move to MW12-05 to start developing
HNU Reading in Well 0.5 ppm
Completed Development of MW 12-05
HNU Reading of Dev Water 0 ppm
1820 Dumped Dev Water Went Back to Bldg 47 to decon and tear down
Decon pad and do paperwork for today
1910 Left Base

[signature] 7-17-95

07-18-95

0730 Pick up Ryder truck and then generator and Ice

0845 Arrive on Base pick up sampling equipment and tank for purge water

0950 FB05 Trip Blank
BTEX, TPH, & Solvents

0955 FB03 Pot Water Sample
BTEX TPH & Solvents

1000 FB04 ASTM II Water Sample
BTEX, TPH, & Solvents

1035 HNU in well 170 ppm & then backed down to 25 ppm MW13-01

1049 Started Purging MW13-01

1110 finished Purging & Sampled Well
BTEX, TPH & Solvents
EB05 Equipment Blank

1130 BTEX, TPH, & Solvents

1145 Duplicate Sample for MW1-13-1
Labeled as MW2-13-01

1300 MW2-12-1 Sampled

1330 MW4-12-1 Duplicate of MW2-12-1

1410 finished purging MW12-01 and Started Sampling MW1-12-01
BTEX, TPH

1450 finished Purging MW12-03 and

7-18-95 [signature]

90 7-18-95

Health & Safety Briefing - Monitor wells with HNu and Breathing Zone before starting work

Sunny all day few clouds steady wind from the North Temp 80's to 90's

P. Brown 7-18-95

7-18-95 91

Started Sampling 1450 Labeled MW3-12-01
BTEX TPH

~~1400~~ 1600 finished Purging MW12-04
and Started Sampling MW4-12-01
BTEX TPH

1650 finished Purging MW12-05
and Sampled; Labeled MW5-12-01
BTEX, TPH

1710 finished at MW12-05 and
went to dump water (purge water)

1900 Left Base

P. Brown 7-18-95

92

93

7-19-95

0815 Cooler temp (3 coolers) all the Same 30°F

[signature] 7-19-95

94

8-28-95

95

Picked up Ryder truck and generator
Picked up cooler~~s~~ and bottles from lab
left Ryder truck on base and marked
bottles back at the motel

[illegible] 8-28-95

0829-95

0730 Arrived on Base after packing car and getting Ice

Met at [illegible] Captain Hunt asked about disposal of Purge Water He said he would find a manhole to dispose of it

Packed Truck and prepared for Sampling

0910 FB06 sample of the DI Water (ASTM Type II) used for Decon Rinse

0910 FB06 Sample of the Tap water used for decon water

0950 Arrived Area 13 MW1-13

HNU Reading 0 ppm

Water level at 8.33 ~~ppm~~ ft below top of Casing PVC

2 inch Well 1 well volume = 1.76 gal

	Initial
Temp	68.1 °F
Cond.	17.09 x100 uS/cm
pH	6.88

	1 Well Volume	2nd	3rd	4th	5th	6th
Temp °F	61.1	60.5	60.8	59.8	6.01	5.94
Cond x100 uS/cm	16.09	15.84	15.48	15.10	15.24	14.98
pH	6.86	6.96	6.69	6.89	6.96	6.59

finished Purging 1026

Started Sampling 1030

Completed Sampling 1046

[signature] 8-29-95

 08-29-95

Cloudy Wind from SE Temp ranging from 70's to 80's humid - Rained very hard last night and late yesterday 8-28-95 up to 3 inches in parts of Sioux Falls

Peter [illegible] 8-28-95

08-29-95

1115 Took Water Level Measurement at 1201 = 7.25 ft

1119 Water level at MW01-12 HNU 0ppm
Had problems with getting generator and pump working - Called Hizco
Went and got another generator
Tracy ~~got~~ purged the well with a bailer I arrived back at 1300 and deconed the pump and hose
Tracy sampled MW1-12-02 at 1320
At 1335 we set up ~~on~~ MW5-12
HNU 0 ppm
1350 started purging MW5-12 with grundfos pump
1415 Completed purging
1420 Started Sampling MW5-12-02
Completed Sampling at 1430
Duplicate taken MW6-12-02 taken of MW5-12-02 and given time of 1230
1500 opened up MW4-12 1PPM - HNU
1535 Completed purging
1536 Sampled MW4-12 = MW4-12-02
1540 Completed Sampling
1545 Set up on MW3-12
HNU = 1.5 ppm
1550 Started purging MW3-12

Peter [illegible] 8-28-95

08-29-95

All the Wells on the Ramp have Water in the cap area which was several inches deep 6 to 12 inches. the caps do not have a rubber seal. The caps to the wells are sealed and none of them appear to have leaked

[signature] 8-~~28~~ 29-95

0829-95

1637 Completed Purging
1640 Sampled MW3-12 Completed Sampling 1650
1655 Set up on MW2-12
HNU - 2 ppm
1701 Started Purging Well
1755 Completed purging Well
1800 Started Sampling Well
1820 Completed Sampling Well
Took MS and MSD at this well
Samples MW2-12-02, MSD1, and MSD01
1930 left base
put more ice on samples at motel

[signature] 8-29-95

08-30-95

0645 filled out chain-of-custody and packed samples in coolers Cooler temp 3.3°C

0800 Arrived on base

0821	MW12-03	Water level at 8.27 ft
0824	MW12-04	8.18
0829	MW12-05	7.49
		7.31
0834	PZ03	7.45
0839	MW12-02	8.54
0843	MW12-01	7.23
0848	PZ01	6.93
0853	PZ02	8.26
0858	MW13-01	

Tracy Bugg took samples to the Lab (Huntingdon) while Capt Punt and I Took water level measurements in the Wells and Piezometers.

We then dumped Water down sanitary Sewer drain, Tracy Slipped and fell partway into sewer trap box where we were dumping the purge water.

We then returned the truck, generator and shipped rental equipment to Harco

Tracy then took a shower and we checked out of the motel Met with Captain Punt in the afternoon to pack equipment

[signature] 8-30-95

8-30-95

and turn over to base. Shipped rental equipment back to Harco,

[signature] 8-30-95

HNU PID Model PI 101 Rental Huntingdon
S/N 801192 6-15-95
10.2 eV probe

HNU PID Model PI 101 Rental HAZCO
S/N 101102 7-11-95
10.2 eV probe Hazco S/N 2288

Hydac Conductivity/Temperature/PH
Beta Technology Inc. S/N 9402 7-11-95
Rental HAZCO # 6841

HNU PID Model PI 101 Rental Hazco
SN Hazco # 9214 16 8-28-95
10.2 eV probe

Solinst Water level Meter SN 17037 8-28-95
Hazco Rental Hazco # 12709

Hydac Conductivity/Temperature/pH 8-28-95
Beta Technology Inc. SN 9402
Hazco Rental Hazco # 6941

M&TE INVENTORY

HNu PID Model HW-101 HAZCO RENTAL 6/8/95 -
Serial Number: 470013
HAZCO #: 6731
10.2eV PROBE HNu Serial #: 270105

CALIBRATION GAS:
100 ppm ISOBUTYLENE
HAZCO SERVICES MFG. DATE 05/95
LOT #: 42465

HYDAC Conductivity, temperature, pH Tester Beta Technology Inc.
Serial #: 9502
HAZCO RENTAL: 6/13/95 -
HAZCO #: 12298

WATER LEVEL INDICATOR:
HAZCO DIAMETER FOR WATER LEVEL MEASUREMENT
HAZCO RENTAL: 6/13/95 -
HAZCO #: 3438

M&TE EQUIPMENT CALIBRATION

EQUIPMENT	Date	PRE	ADJUST	POST	CONDITION	INITIALS
HNU 6731	6/8/95	52 ppm	—	52 ppm	GOOD	MCC
HNU 6731	6/9/95	52 ppm	—	52 ppm	GOOD	MCC
HNU 6731	6/10/95	54	Span @ 10.0	52 ppm	Good	MCC
HNU 6731	6/11/95	50	Span @ 9.74	52 ppm	Good	MCC

EQUIPMENT ID	DATE	PRE	ADJUST	POST	CONDITION	INITIALS
HNU 6731	6/12/95	52 ppm	—	52 ppm	OK	MCC
HNU 6731	6/13/95	52 ppm	—	52 ppm	OK	MCC
HYDAC	6/13/95	7.0 3.93 983%		7.0 4.0 1,000 ms/cm	OK	MCC
HNU 6731	6/15/95	50 ppm	Span @ 9.	52 ppm	OK	MCC
HYDAC	6/15/95	1047 7.07 4.47	Adjust Adjust Adjust	1000 7.01 4.04	OK	MCC
HNU 301192	6-15-95	55	None	~~55~~	OK	[illegible]
HYDAC	6/16/95	1038 7.08 4.14	ADJUST	1000 7.00 4.00	OK	MCC
HNU 2288	7-11-95	68	Adjust	100	OK	[illegible]
HNU 2288	7-12-95	100	None	100	OK	[illegible]
HNU 2288	7-13-95	100	None	100	OK	[illegible]
HNU 2288	7-14-95	99	Adjust	100	OK	[illegible]
HNU 2288	7-15-95	100	None	100	OK	[illegible]
HNU 2288	7-16-95	100	None	100	OK	[illegible]
Hydac 6341	7-16-95	[illegible] 6.99 10.02 4.00	None Adjust Adjust None	1.01 7.00 10.00 4.00	OK OK OK	[illegible]
~~HNU 2288~~ HNU 2288	7-17-95	97	Adjust	100 ppm	OK	[illegible]

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Equipment ID	Date	PRE	Adjust	POST	Condition	Initials
Hydac 6841	7-17-95	Cond. 966	Adjust	1000	OK	PJB
		pH 7.07	Adjust	7.00	OK	PJB
		10.00	None	10.00	OK	PJB
		4.00	None	4.00	OK	PJB
Hydac 6841	7-17-95	Cond. 975	~~Adjust~~	1000	OK	PJB
Hydac 6841	7-18-95	Cond. 970	Adjust	1000	OK	PJB
		7.06	Adjust	7.00	OK	PJB
		3.97	Adjust	4.00	OK	PJB
		10.00	None	10.00	OK	PJB
HN [illegible]	7-18-95	98	Adjust	100	OK	PJB
		PJB ~~7.00~~				
HNM 9014 16	8-29-95	66	Adjust	100	ok	PJB
Hydac 6841	8-29-95			7.00	ok	TS
				4.00	ok	

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APPENDIX M

FIELD CHANGE ORDER

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SAIC
An Employee-Owned Company

Field Change Order (FCO)

FCO No.: 1

Modification No.: 01 Date: 6-26-95 Work Authorization:

Type of Change: Subcontract Cost Priority: O Emergency O Urgent X Routine

Control No.: Project No.: 01-0827-04-3423-008

Requester Identification:

Name: [illegible] Organization: SAIC Phone (703) 749-8903

Title: Project Manager Signature: [signature]

Baseline Identification:

Baseline(s) Affected: X Cost X Scope O Milestones O Method of Accomplishment

Revision Number: 1 Field Manager: Peter Ferron

Description of Change: Phone: (614) 793-7600

1. # of Geoprobe points at Site 12 were changed from 8 to 5.

Justification:

1. Change made in field at the request of Alan Klevans, ANERC Project Geologist - As per conversation on 6-13-95 and Captain Frank on 6-13-95
2. Geoprobe points to be potentially used at Site 1.
3. No major contamination detected at Site 12 from SOV Survey.

Impact of Implementing Request:

1. Based on SOV survey results, this change will result in minimal impact on characterizing nature & extent of contamination at Site 12.

Participants Affected by Implementing Request:

1. ANERC & SJANG

Cost Estimate: $ Estimator Signature: [signature]

Phone (703) 749-8903 Date: 6/26/95

Previous FC Affected: O Yes X No

Approval:

Project Manager Signature: [signature] Date: 6/26/95

CAS Review: Date:

Time from Initiation to Action:

Client Signature: Date:

Science Applications International Corporation ■ 1710 Goodridge Drive, McLean, Virginia 22102

White: File Yellow: Field Manager Pink: Supervisory Geologist Goldenrod: Field Book

SAIC
An Employee-Owned Company

Field Change Order (FCO)

FCO No.: 2

Modification No.: 01 Date: 6-26-95 Work Authorization:

Type of Change: Subcontract Cost Priority: O Emergency O Urgent ☒ Routine

Control No.: Project No.: 01-0827-04-3423-008

Requester Identification:

Name: [illegible] Organization: SAIC Phone: (703) 749-8943

Title: Project Manager Signature: [signature]

Baseline Identification:

Baseline(s) Affected: ☒ Cost ☒ Scope O Milestones O Method of Accomplishment

Revision Number: 1 Field Manager: Peter Petrow

Description of Change: Phone: (614) 793-7680

1. No onsite screening of water sample from 5 Geoprobe pts at Site 12.

Justification:

1. Water samples being sent to fixed laboratory (Huntingdon) for BTEX & TPH analysis.
2. Drilling program delayed by until (all data from field screening and Huntingdon) received.

Impact of Implementing Request:

1. No impact in obtaining nature of groundwater contamination at Site 12. Data to be obtained from groundwater samples sent to Huntingdon.

Participants Affected by Implementing Request:

1. ANALYSTS/SAIC

Cost Estimate: $ — Estimator Signature: [signature]

Phone: Date:

Previous FC Affected: O Yes ☒ No

Approval:

Project Manager Signature: [signature] Date: 6/26/95

CAS Review: Date:

Time from Initiation to Action:

Client Signature: Date:

Science Applications International Corporation ■ 1710 Goodridge Drive, McLean, Virginia 22102

White: File Yellow: Field Manager Pink: Supervisory Geologist Goldenrod: Field Book

Field Change Order (FCO)

FCO NO 03

MODIFICATION NO. 01 DATE 8-9-95 WORK AUTHORIZATION

TYPE OF CHANGE PRIORITY O EMERGENCY O URGENT O ROUTINE

ABS NO. CYWP NO. CWBS NO. O MINOR O MAJOR O OTHER

REQUESTER IDENTIFICATION

NAME Peter J. Ferron ORGANIZATION SAIC PHONE (614) 793-7600

TITLE Site Investigation Specialist SIGNATURE

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED O COST O SCOPE O MILESTONES O METHOD OF ACCOMPLISHMENT

PROGRAM SERVICE ORDER NO. REVISION NO. 01 CAM SIGNATURE Peter J. Ferron

PHONE (614) 793-7600

DESCRIPTION OF CHANGE

SOV sampling depths were only 3 instead of 6 at Site 12 and 5 at Site 13

JUSTIFICATION

The groundwater was at about 7 ft Site 12 and the SOV could not be taken in the groundwater (at about 9 ft for Site 13) Change made in field as per request of ANGRC Project Geologist.

IMPACT OF IMPLEMENTING REQUEST

Istead of 300 SOV samples (50 points x 6 depths) at Site 12 and 25 SOV samples at Site 13 (5 points x 5 depths); 150 samples were taken at Site 12 and 24 SOV samples were taken at Site 13 (6 points x 4 depths)

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST

ANGRC & SDANG

COST ESTIMATE $ ESTIMATOR SIGNATURE

PHONE 703/749-8903 DATE 8/11/95

PREVIOUS FC AFFECTED O YES ☒ NO

APPROVAL

PROJECT MANAGER SIGNATURE DATE 8/11/95

QAS REVIEW DATE

TIME FROM INITIATION TO ACTION

Figure 10-6. Field Change Request Form

FCO NO 04 **Field Change Order (FCO)**

MODIFICATION NO. 01 DATE 8-9-95 WORK AUTHORIZATION

TYPE OF CHANGE PRIORITY O EMERGENCY O URGENT O ROUTINE

ADS NO. CYWP NO. CWBS NO. O MINOR O MAJOR O OTHER

REQUESTER IDENTIFICATION

NAME Peter J. Ferron ORGANIZATION SAIC PHONE (614) 793-7600

TITLE Site Investigation Specialist SIGNATURE Pete J. Ferron

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED O COST O SCOPE O MILESTONES O METHOD OF ACCOMPLISHMENT

PROGRAM SERVICE ORDER NO. REVISION NO. 01 CAM SIGNATURE Peter J. Ferron

DESCRIPTION OF CHANGE PHONE (614) 793-7600

Depths of the Wells and Piezometers 15 feet BLS instead of 25 ft BLS and the screen 2 ft above the Water Table to 8 ft below instead of straddling the water table

JUSTIFICATION

The water table was 6 to 8 ft BLS
change made in field as per request of ANGRC Project Geologist.

IMPACT OF IMPLEMENTING REQUEST

The well placement at this depth will provide a better well ~~for~~ during seasonal fluctuations in groundwater elevation

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST

ANGRC + SDANG

COST ESTIMATE $ ESTIMATOR SIGNATURE

PHONE (703) 749-8903 DATE 8/11/95

PREVIOUS FC AFFECTED O YES O NO

APPROVAL

PROJECT MANAGER SIGNATURE DATE 8/11/95

QAS REVIEW DATE

TIME FROM INITIATION TO ACTION

Figure 10-6. Field Change Request Form

Field Change Order (FCO)

FCO NO 05

MODIFICATION NO. 01 DATE 8-9-95 WORK AUTHORIZATION

TYPE OF CHANGE PRIORITY O EMERGENCY O URGENT O ROUTINE

ADS NO. CYWP NO. CWBS NO. O MINOR O MAJOR O OTI

REQUESTER IDENTIFICATION

NAME Peter J. Ferron ORGANIZATION SAIC PHONE (614)793-7600

TITLE Site Investigation Specialist SIGNATURE Peter J. Ferron

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED O COST O SCOPE O MILESTONES O METHOD OF ACCOMPLISHMENT

PROGRAM SERVICE ORDER NO. REVISION NO. 01 CAM SIGNATURE Peter J. Ferron

DESCRIPTION OF CHANGE PHONE (614)793-7600

Sand pack was brought up to 1 foot above the top of the screen instead of 2 ft.

JUSTIFICATION

Two feet of sand would have brought up the bentonite seal too close to the surface and there would not be enough room for grouts, and lowering the well would put the water table only one foot ~~above~~ below the top of the screen

IMPACT OF IMPLEMENTING REQUEST

Based on the amount of room at the top of the water table and the need for 2 feet of bentonite seal and a minimum of one foot of grout, one foot of sand was the better alternative to lowering the well

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST

ANGRC + SDANG

COST ESTIMATE $ ESTIMATOR SIGNATURE [signature]

PHONE (71?)749-8903 DATE 8/4/95

PREVIOUS FC AFFECTED O YES ⊗ NO

APPROVAL
PROJECT MANAGER SIGNATURE [signature] DATE 8/11/95

QAS REVIEW DATE

TIME FROM INITIATION TO ACTION

Figure 10-6. Field Change Request Form

Field Change Order (FCO)

FCO NO 06

MODIFICATION NO. ______ DATE 8-9-95 WORK AUTHORIZATION ______

TYPE OF CHANGE ______ PRIORITY ○ EMERGENCY ○ URGENT ○ ROUTINE

ADS NO. ______ CYWP NO. ______ CWBS NO. ______ ○ MINOR ○ MAJOR ○ OTI

REQUESTER IDENTIFICATION

NAME Peter J. Ferron ORGANIZATION SAIC PHONE (614) 293-7600

TITLE Site Investigation Specialist SIGNATURE Peter J. Ferron

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ COST ○ SCOPE ○ MILESTONES ○ METHOD OF ACCOMPLISHMENT

PROGRAM SERVICE ORDER NO. ______ REVISION NO. 01 CAM SIGNATURE Peter J. Ferron

DESCRIPTION OF CHANGE PHONE (614) 293-7600

One - two-inch well wass installed at Site 13 instead of 2 wells

JUSTIFICATION

Change made in field at the request of ANGRC Project Geologist
No major contamination detected at Site 13 from SOV, and Geoprobe soil and groundwater samples

IMPACT OF IMPLEMENTING REQUEST

Based on SOV, and Geoprobe sample results, this change will result in minimal impact on characterizing the nature and extent of contaminate at Site 13

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST

ANGRC + SDANG

COST ESTIMATE $ ______ ESTIMATOR SIGNATURE [signature]

PHONE (703) 749-8911 DATE 8/4/95

PREVIOUS FC AFFECTED ○ YES ⊗ NO

APPROVAL
PROJECT MANAGER SIGNATURE [signature] DATE 8/11/95

QAS REVIEW ______ DATE ______

TIME FROM INITIATION TO ACTION ______

Figure 10-6. Field Change Request Form

FCO NO 07

Field Change Order (FCO)

MODIFICATION NO. ______ DATE 8-9-95 WORK AUTHORIZATION ______

TYPE OF CHANGE ______ PRIORITY ○ EMERGENCY ○ URGENT ○ ROUTINE

ADS NO. ______ CYWP NO. ______ CWBS NO. ______ ○ MINOR ○ MAJOR ○ OT

REQUESTER IDENTIFICATION

NAME Peter J. Ferron ORGANIZATION SAIC PHONE (614) 793-7600

TITLE Site Investigation Specialist SIGNATURE Peter J Ferron

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ COST ○ SCOPE ○ MILESTONES ○ METHOD OF ACCOMPLISHMENT

PROGRAM SERVICE ORDER NO. ______ REVISION NO. 01 CAM SIGNATURE Peter J. Ferron

PHONE (614) 793-7600

DESCRIPTION OF CHANGE

Five 4-inch wells were installed at Site 12, (instead of 4)

JUSTIFICATION

Change made in the field at the request of ANGRC Project Geologist Groundwater flow direction fluctuations due to high water table and pumping of Municipal wells neck to surround source areas

IMPACT OF IMPLEMENTING REQUEST

Based on the fluctuations in Groundwater flow direction, the additional well at Site 12 will provide better characterization of the nature and extent of contamination at Site 12

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST

ANGRC + SDANG

COST ESTIMATE $ ______ ESTIMATOR SIGNATURE [signature]

PHONE (703) 749-8903 DATE 8/11/95

PREVIOUS FC AFFECTED ○ YES ● NO

APPROVAL

PROJECT MANAGER SIGNATURE [signature] DATE 8/11/95

QAS REVIEW ______ DATE ______

TIME FROM INITIATION TO ACTION ______

Figure 10-6. Field Change Request Form

Field Change Order (FCO)

FCO NO 08

MODIFICATION NO. ________ DATE 8-9-95 WORK AUTHORIZATION ________

TYPE OF CHANGE ________ PRIORITY ○ EMERGENCY ○ URGENT ○ ROUTINE

ADS NO. ________ CYWP NO. ________ CWBS NO. ________ ○ MINOR ○ MAJOR ○ OTH

REQUESTER IDENTIFICATION

NAME Pete Ferron ORGANIZATION SAIC PHONE (614) 793-7600

TITLE Site Investigation Specialist SIGNATURE

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ COST ○ SCOPE ○ MILESTONES ○ METHOD OF ACCOMPLISHMENT

PROGRAM SERVICE ORDER NO. ________ REVISION NO. 01 CAM SIGNATURE Peter J. Ferron

PHONE (614) 793-7600

DESCRIPTION OF CHANGE

Disposable Bailers used in sampling Wells rather than decontaminating teflon or stainless steel bailers

JUSTIFICATION

No chance of ~~decontamination~~ cross-contamination of wells by using the same bailers

Cut down on the generation of decontamination fluids

IMPACT OF IMPLEMENTING REQUEST

No impact on obtaining nature of groundwater contamination

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST

ANGRC + SDANG

COST ESTIMATE $ ________ ESTIMATOR SIGNATURE

PHONE (703) 749-8903 DATE 8/4/95

PREVIOUS FC AFFECTED ○ YES ⊘ NO

APPROVAL

PROJECT MANAGER SIGNATURE ________ DATE 8/11/95

QAS REVIEW ________ DATE ________

TIME FROM INITIATION TO ACTION ________

Figure 10-6. Field Change Request Form

Field Change Order (FCO)

FCO NO 09

MODIFICATION NO. ____ DATE 8-9-95 WORK AUTHORIZATION ____

TYPE OF CHANGE ____ PRIORITY ○ EMERGENCY ○ URGENT ○ ROUTINE

ADS NO. ____ CYWP NO. ____ CWBS NO. ____ ☒ MINOR ○ MAJOR ○ OT

REQUESTER IDENTIFICATION

NAME Peter J. Ferron ORGANIZATION SAIC PHONE (614) 793-7600

TITLE Site Investigation Specialist SIGNATURE Peter J Ferron

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ COST ○ SCOPE ○ MILESTONES ○ METHOD OF ACCOMPLISHMENT

PROGRAM SERVICE ORDER NO. ____ REVISION NO. 01 CAM SIGNATURE Peter J. Ferron

PHONE (614) 793-7600

DESCRIPTION OF CHANGE

Sample Containers were not rinsed three times with groundwater before filling

JUSTIFICATION

EPA Specified Cleaned bottles
Contained preservative in bottles which would be lost if rinsed three time

IMPACT OF IMPLEMENTING REQUEST

- No impact on obtaining nature of groundwater contamination

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST

ANGRC + SDANG

COST ESTIMATE $ ____ ESTIMATOR SIGNATURE [signature]

PHONE (703) 749-8903 DATE 8/4/95

PREVIOUS FC AFFECTED ○ YES ☒ NO

APPROVAL
PROJECT MANAGER SIGNATURE [signature] DATE 8/11/95

QAS REVIEW ____ DATE ____

TIME FROM INITIATION TO ACTION ____

Figure 10-6. Field Change Request Form